

*Alls of RR.*

# AMERICAN RAILROAD JOURNAL.

ORDINARY SHEET IRON PREPARED IN THE SAME WAY  
FOR CARRIAGE-MAKING, ETC.  
STEAM NAVIGATION, COMMERCE, FINANCE,

INSURANCE, BANKING, MINING, MANUFACTURES.

**HENRY V. POOR, Editor.**

SATURDAY, JUNE 18, 1859.

Second Quarto Series, Vol. XV., No. 25.—Whole No. 1,209, Vol. XXXII.

ESTABLISHED IN 1831.

PUBLISHED WEEKLY, BY

**JOHN H. SCHULTZ & CO.**

Front Room, Third Floor,

No. 9 Spruce Street.

MARSHALL LEFFERTS & BROTHIER.

# ROOFING.

FLOORING OF RAILWAY BRIDGES, ETC.

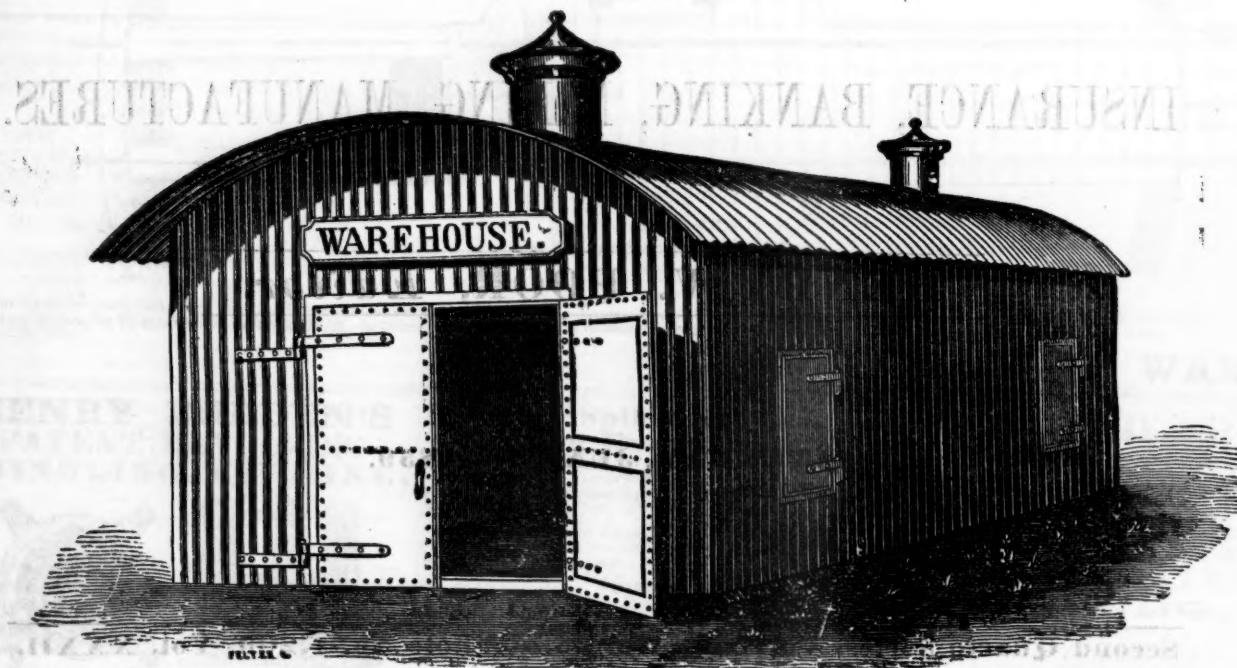
## GALVANIZED SHEET IRON,

CORRUGATED OR PLAIN;

ORDINARY SHEET IRON PREPARED IN THE SAME WAY.

Plans and Estimates given for IRON ROOFS to be erected in any part of the UNITED STATES.

Cornices, Gutters, Ridge Caps, Leaders, Spouts, etc.



### CORRUGATED IRON BUILDING COMPLETE.

FOR CORRUGATED IRON ROOFS we refer to Buildings in the New York Navy Yard, the New Depot of the New Jersey Railroad and Transportation Company at Jersey City, Capitol Extension at Washington, U. S. Custom House, etc., in various parts of the UNITED STATES.

The subscribers have constantly on hand and for sale.

Galvanized RAILROAD SPIKES,  
Galvanized SHIP SPIKES,  
Galvanized SLATING NAILS,  
Galvanized LIGHTNING RODS,

Galvanized HOOP IRON,  
Galvanized CUT and WROUGHT NAILS,  
Galvanized WIRE,  
Galvanized SCREWS,

Galvanized SHEATHING NAILS,  
Galvanized RIVETS,  
Galvanized SHEET IRON, of all Widths  
and Gauges.

### CORRUGATED SHEET IRON FOR ROOFING.

### PLUMBERS AND STEAMFITTERS' BRASS WORK.

SHOT, PIPE AND SHEET LEAD.

Pig Lead, Pig Iron, Sheet Iron, Tin Plates, Spelter, Banca and Straits Tin, Ingot Copper, Braziers' Sheets, and other Metals.

MARSHALL LEFFERTS & BROTHER,  
Nos. 90 and 92 Beekman st., NEW YORK.

# AMERICAN RAILROAD JOURNAL.

STEAM NAVIGATION, COMMERCE, FINANCE,  
INSURANCE, BANKING, MINING, MANUFACTURES.

HENRY V. POOR, *Editor.*

ESTABLISHED IN 1831.

PUBLISHED WEEKLY BY J. H. SCHULTZ & CO., AT NO. 9 SPRUCE ST., NEW YORK, AT FIVE DOLLARS PER ANNUM.

SECOND QUARTO SERIES, VOL. XV., No. 25.]

SATURDAY, JUNE 18, 1859.

[WHOLE NO. 1,209, VOL. XXXII.

MESSRS. ALGAR & STREET, No. 11 Clements Lane, Lombard Street, LONDON, are the authorized European Agents for the Journal.

## PRINCIPAL CONTENTS.

Cairo and Fulton Railroad	385
New Jersey Railroad	385
Cincinnati, Wilmington and Zanesville R. R.	387
The Railroad War—Manifesto of the Baltimore and Ohio Railroad	387
Journal of Railroad Law	388
Treatise on the Principle of Civil Engineering as Applied to the Construction of Wooden Bridges	389
Railroad Earnings	391
Fluctuations in Railroad Property	392
New York, Providence and Boston Railroad	393
Concord Railroad	393
The Competition Question	394
Galena and Chicago Railroad	394
Production of Copper in the United Kingdom	394

## American Railroad Journal.

PUBLISHED BY J. H. SCHULTZ & CO. NO. 9 SPRUCE ST.

New York, Saturday, June 18, 1859.

### Cairo and Fulton Railroad.

At a recent meeting of the stockholders of the Arkansas Division, the following Directors were elected: Edward Cross, James L. Witherspoon, M. Brayman, H. M. Fairchild, I. M. Moore, E. R. McGuire, A. King. The Board was subsequently organized by the election of the following officers: M. Brayman, President; Daniel Ringo, Vice President; Frederick A. Staring, Secretary; Geo. B. Wait, Treasurer. This road extends entirely across the State of Arkansas. Mr. Brayman has been President of the Missouri Division for some time past, and as he is now absent at the East, it is not known whether he will accept the office now tendered him.

The construction of the above road is of vital importance to the people of Arkansas. It would increase by more than \$50,000,000 the value of land in the State the moment it was opened. In the way of the construction of this road, is the default that exists on the part of the State in the payment of the entire debt. The dishonor of a State is, to a considerable degree, the dishonor of all its people. In the present case, the payment of the State debt would have a double advantage

It would be an act of justice to creditors, who have been for years without a penny, either of interest or principal of their unlucky investment, and would, at the same time, be the means of constructing her proposed works which can make no substantial progress, so long as the State is in default upon debts already contracted.

### New Jersey Railroad.

This company held their annual meeting at Jersey City on the 4th instant, at which the usual reports of the directors were submitted.

The capital account was stated to be as follows:

Dr.—To Capital stock	\$3,749,000
Bonds issued	711,420
Surplus profits	342,297
	\$4,802,717
Cr.—By Cost of road	\$3,225,532
Equipment	313,295
Property, chiefly the ferry and appurtenances	1,248,822
Cash in hand	15,568
	4,802,717

The revenue and expenditures for the year were as follows:

RECEIPTS.	
From passengers	\$645,403 20
" freight	78,066 01
" U. S. mail rents, express, freight and other sources	179,989 24
	\$903,458 45

EXPENSES.	
Maintaining railroads, bridges and buildings	\$69,500 27
Repairs of locomotives, cars and machinery	34,677 52
Fuel, cost and labor in preparing	51,510 17
Operating the road and transporting passengers and freight	183,569 68
Office expenses, salaries and contingencies	113,983 22
	349,370 73

Interest on bonds	\$44,496 49
Transit duty on passengers and freight	15,035 51
Tax on capital stock	18,122 50
Dividends in cash, August and February	262,450 00
Profit and loss to surplus earnings	113,983 22
	\$554,087 72

The comparative statement of the last four years exhibits the uniform and gradual improvement of the receipts and expenses and illustrate the economical working of the road.

1855.	1856.
Gross receipts	\$861,514 36
Expenses	360,766 77

Net earnings	\$500,747 59
Ratio of expenses to earnings	44½ per cent. 44 per cent.
Dividends	\$348,235 00

Surplus	78,480 90
Number of passengers	2,164,471

Tons of freight	64,049
Miles run	382,568

Ratio of running expenses per mile	0.94
1857.	1858.

Gross receipts	\$911,617 25
Expenses	376,866 03

Net earnings	\$534,751 22
Ratio of expenses to earnings	41½ per cent.

Dividends	\$348,490 00
Surplus	107,171 18

Number of passengers	2,238,130
Tons of freight	80,872 ½

Miles run	396,032
Ratio of running exp's per mile	0.92 6-10 87⅓ per cent.

Ratio of expenses to earnings	38½ per cent.
Dividends	\$362,450 00

Surplus	113,998 22
Number of passengers	2,100,998

Tons of freight	85,460 ½
Miles run	398,784

Ratio of running exp's per mile	0.92 6-10 87⅓ per cent.
The ratio of expenses to the earnings of the last year (1858) is 88½ per cent.; for 1857, 41½; for 1856 44 per cent. The whole surplus fund, after deducting \$39,204 67 for relaying the road with new rails and additional arches, and improvements to the Raritan viaduct during the past year, now amounts to \$342,297 90.	

The apparent diminution of passengers in 1858 as compared with 1857, is owing to the large increase of commutation tickets; 1,859 of which annual, semi-annual and quarterly, were issued in 1858, and not included in the above enumeration. They are estimated to be equal to 1,040 annual commuters, and are computed to have made 500,000 passages over the road during the year; which is one trip each way for 240 of the 365 days; thus assuming that they ride about two-thirds of the year.

The tax on capital stock paid the State amounts to \$18,122 50. The year previous it was \$17,425. The transit duties for 1858 were \$15,035 51, and the dividends at the rate of 10 per cent. per annum, being \$1,745, were as usual paid in 1858 to the School Fund, on the stock of this company given in payment of the State's Newark Turnpike stock.

An analysis of the pay rolls, and salaries of agents and officers shows that nearly \$100,000 is annually paid for personal services, of which more than one-fifth, or \$21,475 41, is paid to flag and gatemen, watchmen, switchmen and bridge tenders, several thousand more than to the conductors, ticket agents and clerks. In 1858, the flagmen and gatemen received \$5,542, and conductors \$6,707, and the former are constantly increasing, from the desire to afford every reasonable protection, and in compliance with city ordinances.

The following table of receipts from commutations from 1840 to 1858 exhibits the rapid increase of commuters, only three of whom commenced in 1840, when the charge was \$120 a year between Newark and New York for the railroad alone, and \$15 were paid in addition to the ferry, which was then not under the control of our company. The regular railroad fare between Newark and New York was then 37½ cents, with 6 more for the ferry. The annual commutation is now, and has been for many years, reduced to \$50 from Newark to New York, or 8 cents a trip; from Elizabeth, \$55, or 9 cents a trip; from Rahway \$60, or 10 cents a trip; from New Brunswick, \$65, or 11 cents a trip.

#### TABLE OF RECEIPTS FOR COMMUTATIONS.

1840.	\$3,600.00	1846.	\$10,381.50	1853.	\$30,165.56
1841.	2,282.00	1847.	12,660.00	1854.	32,404.55
1842.	3,140.86	1848.	12,753.83	1855.	40,176.22
1843.	6,485.00	1849.	14,242.60	1856.	46,356.29
1844.	8,120.82	1850.	17,907.15	1857.	50,347.77
1845.	9,099.25	1851.	21,377.03	1858.	55,465.77
	1852.	24,126.85			

The decided increase of commutations thus far for the present year renders certain that the whole amount for 1859 will exceed \$60,000.

After defending the commutation system, the report speaks of the system of excursion tickets adopted on the New Jersey road. It says:

The daily excursion tickets, which have proved so great a convenience, as to have been followed by the Hudson River, and some of the New England roads, have sometimes been so severely assailed as to lead to doubt of the propriety of their continuance. Loose items, too, have been published, that a restriction on the use of a ticket on the day sold is not lawful; just as if Railroad Companies are precluded from the rights and privileges incident to individuals and other corporations from making a contract. The decisions of our courts and the higher tribunals of other States have conclusively settled these points. Otherwise the difficulties which are sometimes made would induce the abandonment of the excursion tickets, and the exclusive use of regular tickets. The discrimination of price in favor of daily excursion tickets is deemed just and proper, in view of the facts that the persons using them are most generally frequent customers, residents on the line of the road, and usually go to and fro without baggage; thus being more desirous patrons, and requiring less service of the company. The extension of excursion tickets to several days, or indefinitely, would defeat their design and operate in effect to convert them into regular tickets, and hence the variation in price—which is deemed to be fully justifiable both for commutation and excursion tickets, in view of their greater advantage to the company, and the entitling the party for whom they are intended to more favorable terms—would cease and the advanced rate be uniformly charged. A full comprehension of all the facts and reasons bearing on this subject will produce general satisfaction with the propriety and justice of discriminating rates between regular passengers and commuters and excursionists.

The following results, which exhibit the advantages of coal over wood as a fuel, are of interest:

The coal burners, "Zabriskie" and "Phoenix," have run during the past year, as satisfactory as before; the "Zabriskie" drawing the heavier, and the "Phoenix" the lighter trains, the former at 9 8-10ths cents per mile, the latter at 7 5-10ths cents

per mile. A new engine, to bear the name of "J. J. Cheetwood," the only director who has not yet been thus distinguished, has been ordered. This engine is to be of the first class, and is guaranteed by the builders, Messrs. Rogers, of Paterson, to be superior in construction and its economical working to any on the road. In view of the marked excellence of many of our machines, we are warranted in expecting an engine of extraordinary capacity, and economical performance. We have also adapted one of our first class wood burners, the engine "Gov. Dickerson," to the consumption of coal, by the application of one of Gregg's Patent Improvement, which consists chiefly in constructing a brick arch in the fire-box. The alteration costs \$150, and with the experience now acquired can be made for \$100. Some slight modifications of Gregg's Improvement have been made, and the engine now generates an ample supply of steam, and runs with entire acceptance, performing, in the opinion of our drivers and firemen, with a success fully equal to our other coal burners, drawing the heaviest trains from the first at 10 5-10ths cents per mile, and since the alterations in the smoke stack and fire-box, an economy has been attained quite equal to any of our coal engines. The cost per mile for running a coal engine at present is about 9 8-10ths cents per mile, while the average rate for the whole time we have used coal is 10 5-10ths cents per mile. There is also a reduction now attained in the consumption of wood, from improvements in wood burning engines, which render more economical the use of that fuel, from a diminution in its cost. For the year past, 1858, the cost of wood is found to be 17 5-10ths cents per mile, while for 1857 it was 20 1-10ths cents per mile. The substitution of oak and hickory (on the Millstone road) for pine, has also aided materially in the saving of fuel during the past year, so that the difference in the amount paid for wood in favor of 1858 over 1857 is \$12,746.99. The results of last year, however, show a decided preference of coal over wood—being nearly 47 per cent, in favor of the substitution of the former for the latter, which, had it been entire, would have effected for the year a saving of \$26,864.07; all of which justifies the gradual change from wood to coal burners.

The Company have determined to introduce such improvements in the construction of cars as shall promote the comfort of travelers. Six superior passenger cars are to be constructed in the most complete and finished manner, by Mr. Cummings of Jersey City, and placed on the road in July next; and arrangements are making to introduce sleeping accommodations in the night train of the through line, when the experiments of the various plans shall indicate the one to be preferred.

Material improvements have been made from time to time to the ferry of the Jersey City terminus, and on the entire line of the road. A separate boat has recently been appropriated to the Philadelphia, and the Morris and Essex, and New Brunswick Morning Express lines leaving the easterly end of the large depot at Jersey City on the arrival of the trains. A considerable part of the valuable real estate re-claimed by the company south of the large depot, and fronting on both sides of the spacious court leading from Hudson street to the ferry from the foot of Montgomery street, now called "Exchange Place," has been sold or leased, and improved with large and imposing buildings, which, with the renewed Belgian pavement and extended sidewalks, afford an ample and attractive avenue to the ferry, rendering locations for business there desirable. The old depot west of Hudson street has been re-constructed, and furnishes a canopy for the cars, and protects freight from exposure to the weather, providing on the adjacent sides platforms and freight offices for the convenient loading and unloading of produce and merchandise cars. Tracks have also been extended over Hudson street on the northerly side of the new depot, and a covered platform and other improvements are making for terminal accommodations, and ferry facilities, for the Northern Railroad of New Jersey, which has lately commenced

business under favorable auspices, drawing to its lines a most desirable transportation, and patronized by an industrious, worthy, and most substantial class of our fellow-citizens, located on the route of this enterprising and promising work, who have largely aided its construction, and are identified with its interests and prosperity. The New York and Erie Railroad Company have also made an agreement whereby their track is to be extended to the ferry, enabling them to participate with the Northern Railroad in the improvements east of Hudson street, by which passengers can go to and from the steamboat and cars under cover, and for only a short distance, instead of the long and exposed walk they have been compelled to take. From Jersey City westerly and southerly the whole road is maintained in perfect order, the tracks and bridges receiving every attention and care. The thorough graveling of the road-bed is maintained, the additional graveling beyond ordinary repairs costing upwards of \$5,000 during the past year. The firmness of the superstructure, and the smoothness of the track, saves the racking of the road by the heavy trains at high speed, and diminishes the wear and tear of the rolling stock. The United States Supreme Court have not yet reached the case of the proposed bridge at Newark by the direct route, crossing at Commercial Dock. Its place on the calendar justifies the belief that it will be argued the next term, and can, therefore, be erected as soon as the decision is made.

The construction of the remainder of the double track between Rahway and New Brunswick is vigorously prosecuted, with heavy rails of 70 pounds to the yard. A considerable portion is now in use to the great convenience of the increased trains south of Rahway; the whole is expected to be completed in August, affording a road-bed, and superstructure, with double track, of unsurpassed solidity and smoothness, thus promoting ease, expedition, economy, and safety, in the running of the road. At the terminus of the junction road near the Morris and Essex depot in Newark, the company are preparing for the transportation of local freight from that part of the city to and from New York; and also for a coal yard, where coal will be received directly from the mines in cars, thus furnishing conveniences for freight and fuel more advantageous than now exists in any part of the city.

The schedule of trains for the present year shows additional trains from each place, over any previous period, and exhibit a marked contrast in ten years, as follows:

Trains in 1849 and in 1859		
Between New York and Newark..	22	70
" New York and Elizabeth..	14	32
" New York and Rahway..	12	24
" New York and New Brunswick.....	10	18
Total .....	58	144

The number of Philadelphia trains have also increased in the last ten years from 6 to 12.

The company have carried since the road went into operation 30,000,000 of passengers, without injury to life or limb, which certainly bespeaks a careful oversight of its business. The improvements made within a few years have added vastly to the comfort of the passage between New York and Philadelphia. The affairs of the company are in a most prosperous condition, and never looked better for the future. Its road earns \$30,000 per mile per annum; a larger sum per mile than any other road in the United States earns, devoted chiefly to the transportation of passengers.

The following gentlemen were chosen Directors for the current year: John S. Darcy, Stephen Whitney, Henry R. Remsen, Hamilton Fish, Dudley S. Gregory, John P. Jackson, A. O. Zabriskie, J. J. Cheetwood, John Acken.

**Cincinnati, Wilmington and Zanesville R.R.**  
 Mr. E. Gest, late receiver of this company, having terminated his relations with it, has submitted to the court a report of the operations of the company during the time they were under his charge. We know of no adequate cause for his retirement. His reports, of which he has made two, are models in their way, and present a full view of the manner in which each branch of service has been conducted. Judging from these, Mr. Gest appears to have carried out a difficult undertaking in a manner very creditable to himself and advantageous to the owners of the road. Such being the case, it is difficult for us to understand why he has been superseded by an elderly gentleman, certainly very much his inferior in activity, and in a practical knowledge of railroad affairs. It looks like jumping out of the frying pan into the fire. But appointments of the above character, like some other things, go by favor, and have seldom much reference to the qualifications of the parties.

The following is a summary of Mr. Gest's report:

The earnings and expenses from July, 1853, the period when they were first reported, to March 1, 1857, were:

	Earnings.	Expenses.
From July 1853, to April, 1856, 32 months.	\$261,860 98	\$244,355 05
From April 1856, to Nov. 1856, 7 months.	140,133 14	174,586 07
From Nov. 1, 1856, to March, 1857, 4 mos.	70,895 92	79,567 69

Total for 43 months. \$472,890 04    \$492,508 81  
 —or an excess of expense over receipts of \$19,618 77.

The deterioration of property during the same time was as follows:

Ties	\$34,763 09	Culverts	\$3,000 00
Bridges	38,810 67	Fencing	2,150 00
Spikes	6,552 65	Buildings	6,402 25
Chairs	5,324 55	Machine sh'p	6,100 00
Iron	43,055 92	Cars	48,430 00
Girder bridg's	1,850 00	Locomotives	24,000 00
Trestle work.	659 00	Miscellane's.	5,000 00

Total depreciation ..... \$226,098 13  
 To which add above deficit ..... 19,618 77

Total deficit and depreciation ..... \$245,716 90

In other words, the cost of operating the road, including the estimated deterioration, prior to March 1, 1857, exceeded the earnings \$245,716.90.

Such was the condition of the road and its outfit at the time it passed into the hands of Mr. Gest, March 4, 1857. From that time to May 1, 1859, a period of 26 months, the earnings were \$454,557.88. And the expenditures were ..... 397,995.52

Or an excess of earnings of ..... \$56,562.36  
 From which deduct depreciation of ties, bridges and iron ..... 55,866.49

Leaving as net earnings ..... \$695.87  
 —over and above repairs and deterioration.

The deterioration of the property during that period was confined to these three items—the other matters pertaining to road-bed, rolling stock and buildings, having not only been maintained, but their condition as a whole actually improved.

The earnings of the road for the fiscal year ending May 1, 1859, were:

From passengers ..... \$68,826 80  
 " freight ..... 108,117 19  
 " mail, express, etc. ..... 18,801 77

\$190,745 66

Less ordinary and extraord'y expenses:	
Passenger trains.	\$69,877 23
Freight	102,188 11
	171,565 34

Net earnings ..... \$19,180 32

The above expenditures are classed as follows:

Ordinary	\$139,416 96
Extraordinary	32,148 39
	\$171,565 34

Of which are chargeable to prev's yrs.:

Ordinary	\$8,400 00
Extraordinary	17,953 60
	26,353 60

Actual expenses chargeable to the y'r. \$145,211 74

Of the extraordinary expenditures, \$25,648 was for the re-construction of some large truss bridges, trestle work, etc., 70 per cent. of which, or \$17,953 60, is chargeable to deterioration prior to March, 1857.

#### PROFIT AND LOSS ACCOUNT.

Receipts from March 4, 1857:	
Passenger receipts.	\$197,309 20
Freight	268,294 68
Donation, mileage, sales of old materials, etc.	20,107 71
	\$485,711 59

Expenses for same time:	
Ordinary expenses	\$373,228 26
Extraordinary expenses	32,148 59
	405,376 85

Balance to credit of profit and loss. . . . \$80,334 75

The following is a condensed balance sheet from Receiver's books, May 1, 1859:

DR.	
Transportation expenses	\$405,376 85
Invested in real estate, cars, shop, bal-	
lasting and widening road	71,582 52
Bills receivable	1,818 05
Post office department	4,987 50
Materials on hand	4,458 79
Claims created prior to receivership paid out of trust fund	32,967 35
Due from roads and individuals	636 37
	\$521,827 43

CR.	
Earnings of road	\$485,711 59
Due sundry roads and individuals	4,635 16
Bills payable	4,909 05
Pay roll	15,340 82
Bridge account	7,834 74
Receiver in advance	3,395 07
	\$521,827 43

#### Portland, Saco and Portsmouth Railroad.

The report of the Directors for the year ending May 31st, commences by assuring the stockholders that their property in the road is safely invested, and that they are secure and certain of semi-annual dividends. The receipts of the year (May estimated) are \$208,299; expenditures, \$104,270; net income, \$104,029. After paying dividends of \$90,000, the surplus earnings of the year are \$14,029. The surplus earnings of last year were \$40,722. Several improvements have been made during the year, the most important of which are the erection of a freight house at Portland, building and renewing bridges, and the building of a new station-house at Wells.

The report was unanimously accepted. The following is the list of Directors chosen: Ichabod Goodwin, Portsmouth; George M. Browne, Boston; Francis Cogswell, Andover; Thomas West, Haverhill; Charles E. Barrett, Portland; James Hayward, Boston; Nathaniel Hooper, Boston. This road is managed by John Russell Jr., Superintendent, and is admirably conducted.

#### The Railroad War—Manifesto of the Baltimore and Ohio Railroad.

At a meeting of the Directors of the Baltimore and Ohio Railroad, held on the 8th inst., the following statement was submitted by the President of that Company, Mr. Garnett, in reference to the quarrel between the four great lines.

Mr. Garnett commenced by stating that on the 13th of April he presented his views regarding the policy to be maintained by the Baltimore and Ohio Railroad Company, on the crisis arising from the extraordinary positions assumed by the New York Central Road, and the course he had felt it his duty to pursue in competition with the Atlantic lines, for the protection, in a comprehensive view, alike of the interests of the company, and of the city of Baltimore.

He had the satisfaction of receiving the unanimous approval of the Board of his action, and the policy indicated. Notwithstanding the general disapproval manifested by the press at the North, as well as the South and West, and, it is understood, by a large portion of their stockholders, the managers of the New York Central Company have continued their Quixotic crusade against the city of Baltimore to an extent which, whilst generally damaging railway property, is rapidly developing in such a contest the relative weakness of that line, and the strength and advantages of the Baltimore and Ohio Railroad and its terminus.

It is due to the magnitude of the interests involved that a distinct statement should be presented, of the issue made by the New York Central Company; and of the position occupied and maintained by this Company, and the facts and reasons governing the latter, so that the serious responsibility of continuing a state of things producing most disastrous results to vast amounts of railway property, shall be properly placed. The New York Central Company demands that the rates from New York, Boston, Philadelphia, and Baltimore, to the commercial centres of the West and South-west shall be the same. The illustration of the case, in connection with the city of Baltimore, will exhibit the fallacy and absurdity of the principles announced. Cincinnati, as the leading city of the Ohio valley, has commanded the most attention in the discussions of the conventions of the four lines. What are the relative positions of New York and the New York Central Company, and Baltimore, and the Baltimore and Ohio Company, to that city.

The distance from New York, via the New York Central Road, and the shortest railway line to Cincinnati is ..... 880 miles. The distance from Baltimore by the shortest railway line to Cincinnati is ..... 582 miles. Leav'g the difference in fa'r of Baltimore. 298 miles. The entire length of the New York Central Road from Albany to Buffalo is ..... 298 miles.

It therefore clearly follows, unless the New York Central Road concludes to render the service for its entire length, without any remuneration whatever, if the connecting roads of the Baltimore and Ohio Company in Ohio, can work at the same rates as the connections of the New York Central, it must abandon this demand. It has claimed great relative advantages during the season of river and lake navigation, and economy of working arising from low grades, &c.

What are the facts? Assume the use of the Hudson River to Albany, and of the Lake from Buffalo to Cleveland, yet the actual rail transportation is, viz:

On New York Central Road ..... 298 miles.  
 And from Cleveland to Cincinnati ..... 255 "

553 "

Whilst from Baltimore to Parkersburg, on the Ohio river, 200 miles below Pittsburgh, the distance is but ..... 383 "

170 "

Exhibiting the transportation by rail from the

city of New York in favor of the Baltimore route, using the canal or sea, from New York to Baltimore, making the Baltimore and Ohio line the cheapest from the city of New York, and proving, conclusively, the absolute advantages of the location of Baltimore.

The errors of that company are still more glaring as to the relative ability for an economical working. The subjoined statement furnishes the cost of fuel of the New York Central and Baltimore and Ohio Roads, for the past three fiscal years, derived from the annual reports:

Cost of Fuel to B. & O.	Cost of Fuel to N. Y. C.	Difference.
1856....\$201,669.39	\$768,583.21	\$566,913.82
1857....209,665.15	847,853.14	638,187.99
1858....167,550.64	766,903.37	599,352.73

\$578,885.18 \$2,383,339.72 \$1,804,454.54  
Average difference per annum.....\$601,484.84

In consequence of the inexhaustible supplies of bituminous coal, at almost nominal prices, and of the most desirable character for generation of steam, upon a large portion of the road, the Baltimore and Ohio Company has a permanent advantage over that Company in this great economy, which has proved to average an amount exceeding \$600,000 per year—a sum equivalent to dividends of 6 per cent. on the capital stock of this Company.

During the month of April, notwithstanding the low rates of transportation forced upon the railway interests by the New York Central Company, the net profits of this road were satisfactory—the working expenses being but 47 per cent. The results for the past month are still more remarkable and interesting.

All the power of that great corporation, which for many years so largely dictated and controlled the railway policy of the country, has been wielded adversely for the interests of this company, and the fruition is a large reduction in its revenue, combined with immense losses through low rates arranged by its authority and dictation, whilst a decided increase of the revenues of the Main Stem of the road has been realized, as well as a slight aggregate increase of the entire revenues of the company beyond the same month last year.

Combined with this extraordinary exhibition of the relative success and power of the Baltimore and Ohio Road is the fact that with all the disadvantages, the working expenses for the month were but 44.76-100 per cent.

The public has practically approved the policy of the company in reference to the reasonable and safe speed of passenger trains. Thus whilst the New York Central has adopted a speed, deemed by this company reckless, dangerous, and costly, in connection with which most serious results have occurred, involving in that road loss of life and limb, this company has maintained a speed of 25 miles an hour without accident, making regular conceptions, and fully preserving its business, at large advantages; also, of economy in running.

The developments, therefore, exhibit the ability of this company to maintain its platform of protection of all the great interests confided to its charge, the commercial and geographical rights of Baltimore, and its dividend earning capacity for its stockholders.

As the policy has met the cordial sanction and support of the community, its shareholders and the Board, the Executive deems it proper to announce his continued determination to enforce and maintain the just advantages and rights of the city of Baltimore, and of the company.

Mr. Garret must not rely, to maintain the greater economy with which his road can be run, upon the amount previously expended for wood on the New York Central Road. This company are now making the same amount of wood go twice as far as it did two years ago. They are rapidly reducing this item of expenditure within reasonable limits. But the Central Railroad has coal, not so cheap as the Baltimore and Ohio Railroad, but they can deliver the best quality of bituminous at

\$8.00, or \$8.50, upon every portion of their line, or cheaper than the Baltimore and Ohio Railroad can deliver it at Baltimore. If this company have learned the art of burning coal, the Central can easily copy it, and in this way remove the disparity which now exists on the score of fuel.

This wood account of the Central, to which Mr. Garret refers, has, we are inclined to think, been one of the *unventilated* corners in this great concern—a sort of unknown quantity, perhaps, swelled by other unknown or uncertain quantities. We see good evidences that it is now being sharply looked after. In 1856 and 1857 it took one cord of wood to run 19 miles. Now, on some divisions of the road, a cord is made to carry the train more than twice the distance named. It is not so much matter how this saving has been effected as the fact that it has been. We have, no doubt, too, that the Central will rapidly get into the use of coal, which can be supplied at low rates, and of the best quality.

#### Journal of Railroad Law.

It is well known to our readers that in 1847 and 1849, that certain statutes were passed in the State of New York, providing that thereafter when any person should be killed by the wrongful neglect or default, the personal representatives might recover damages from the party causing such death, to an amount not exceeding \$5,000. Several other States of the Union have passed similar acts.

In the application of these statutes to railroad companies, the question is of considerable interest. May an action be maintained in one State, under a statute of this description, for a death caused in another State where no such statute exists? This question has arisen in two cases lately before the Supreme Court of the State of New York, before two different judges, and has been differently decided in the two cases. In such cases, of course the question must remain an open one until it shall be passed on upon appeal; but in the meantime, the views expressed on the respective sides of the question will be found to possess interest.

The first of the cases we refer to is that of Van-deventer vs. The New York and New Haven Railroad Company. The action arose out of what is known as the "Norwalk Disaster," which occurred at Norwalk, in Connecticut, in 1852, by the running of defendant's train off an open bridge. The plaintiff was executor of one of the persons killed by that accident; and he brought this suit in New York State to recover damages, under the statute.

On the trial the plaintiff recovered a verdict; but when he came afterwards to move for judgment in his favor, the judge before whom the motion was made, decided that no action could be maintained for the following reasons:

PEABODY, J.—The objection made by the defendant's seem to be entirely fatal to this case. The deceased was killed instantly by the negligence of the defendants. At common law no action for damages would lie for such a killing. (Warley vs. Cincinnati, Ham. and Dayton Railroad Company, 1 Handy's Ohio Ref. 481. Ashby vs. White, 2 Smith's Lead. Cas. 131 note.)

This accident, and the acts and omissions complained of, occurred in Connecticut; and whether an action will lie for acts done there, depends on the laws of Connecticut. New York does not pre-

scribe what may not be done in Connecticut; nor does she decide what shall be the consequence of acts done there, or whether they be or be not actionable. What the laws of Connecticut are on the subject, does not appear, either by the pleadings or the evidence. They were neither pleaded nor proved, and we are not at liberty to speculate upon or ascertain for ourselves, this more than any other fact, material and necessary to a recovery. This Court cannot judicially know them. In the absence of all evidence on the subject, it can at most only intend that the common law prevails there; and that by that the plaintiff would have no right of action. A statute, to be sure, exists in this State which gives an action to the representatives of a person killed by the wrongful act or negligence of another, and would warrant a recovery on the facts appearing here, if they had occurred in this State. But that statute, in the nature of things, can have no extra-territorial application, and does not give an action for an act done out of this State. (Campbell vs. Rogers, 2 Handy's Ohio Ref. 110. 9 Law Ref. N. S. 329. 4 Am. Law Reg. 747.) Whether an act or omission affords a right of action depends on the law of the place where it is done or omitted. As to matters of this kind, the States are foreign to each other. The laws of one State are not in force as laws in another, and the act done in Connecticut may, for all the purposes of a right of action under the laws of this State, as well have been done in Russia. And as to any knowledge as to the laws of any other State or country, courts of this State may as well take cognizance of the laws of Russia, as those of Connecticut. Our statutes are not in force as law in Connecticut, and they cannot give rights of action, for causes not otherwise actionable, arising or occurring within the limits of that State. The plaintiff's right of action, and the nature and extent of his rights, and the relief to be had, depend on the law of the State where the acts complained of occurred, and the cause of action arose.

The common law as has been said we are to intend prevails there, and by that law the plaintiff could have no action. Whether there be any statutory provision in that State, and if so, what it is, we are not to know save by legal evidence. This evidence does not appear in the case. The complainant should state the fact, like any other fact, in the first place, and if it be not admitted by the pleadings, it should be proved, like any other fact on the trial. In this case, it is neither pleaded nor proved, and indeed the case and arguments of the counsel, bear ample evidence that the recovery was expected and claimed by the plaintiff, under a statute of this State, passed in the year 1847. It is, I suppose, beyond all doubt that the plaintiff cannot maintain an action by virtue of that statute, on the facts appearing here, and the judgment must accordingly be reversed.

The other case we have referred to, was that of Beach vs. The Bay State Company. John C. Beach was killed by explosion of a boiler on the steamboat Empire State, a boat owned by defendants, and running between New York and Fall River. His widow brought an action for damages in New York. The complainant did not state whether the accident happened in the State of New York or not; and defendant demurred to the complaint. The judge held that the action could be maintained on the following grounds:

**CLERKE, J.**—It cannot be denied that any one State or nation has a right to give its citizens redress for any injury committed without, as well as within, its territorial limits, when it obtains the means of exercising jurisdiction on the wrong-doer. This has always been recognized in the common law. Many, if not most, of the actions instituted in our courts of justice are transitory, and not local; and if the cause upon which any one of them is founded, arose in Japan, it would be just as tenable as if it arose in the State of New-York. The authority of the State, in this respect, is not curtailed because the redress is given by statute, instead of having been permitted by the common law. They are both, alike, the expression of the supreme power, and equally entitled to obedience and respect. It is erroneous, therefore, to say "that statutes (which means all statutes) are local, and only effectual within the limits of the State, on acts therein done."

A penal law, indeed, is strictly local, and has no operation beyond the jurisdiction of the county where it was enacted. But whether a remedial statute is extra-territorial in reference to the class of injuries for which it proposes to afford redress or compensation, depends, like other statutes, upon the intention of the legislature, to be gathered from the language employed; the law as it previously existed, in relation to the same subject, the mischief to be prevented, and the remedy to be applied; and we must also bear in mind that very such statute is to be liberally construed.

It has been asserted that the statutes of 1847 and 1849, allowing compensation to the representatives of deceased persons, for causing the death of those persons by wrongful act, neglect or default, are penal and not remedial statutes. The second section of the act of 1849 is undoubtedly penal. But a penal statute may also be a remedial law, (1 Wils. 126,) and a statute may be penal in one part and remedial in another. (Doug. 702.) But in the redress which these statutes afford to the bereaved families of those who have been deprived of life by the wrongful act, neglect or default of others, they are entirely remedial, and they are calculated to be most beneficial in their operation—not only in their compensatory effect in warding off, at least for a season, the destitution of many a family bereft of its provider, but in preventing the frequent occurrence of the melancholy disasters, which are too often the result of the most culpable carelessness and disregard of human life.

I can see no reason to infer that the legislature intended to confine the operation of these acts, in their remedial features, to injuries committed within the territorial limits of this State, so as to exempt persons, natural and artificial, residing in other States, provided the necessary steps are taken to obtain jurisdiction over such persons. The language is, doubtless, very general, and does not expressly specify injuries committed without the State, and does not specify anything relative to the residence or citizenship of the perpetrators of the injury; or if they are artificial persons, the place or country where they were organized. But, on the other hand, it does not except such injuries, or such persons.

And there is no reason whatever to suppose when we consider the nature of the calamity to be redressed, and the purpose for which redress is

prescribed, that the legislature intended any restriction beyond what the generality of the language itself imports.

With regard to the penal section of the act of 1849, we cannot by that construe the remedial section. Each stands by itself, on the well known rules of the constitution—a strict construction for the one, and a liberal construction for the other. And, in the absence of any thing to the contrary, we are to suppose that the legislature intended that the acts in question should be interpreted according to those rules, which are part and parcel of the law of the land, recognized by the legislature as well as by the judiciary, and all laws, it must be presumed, are formed in reference to them.

And after all, do not these statutes merely provide, in their remedial character, an extension of the remedy afforded by the common law? To be sure the death of the deceased, and not the injury which caused the death, is the immediate ground of the action. But the death is the sad result and serious aggravation of the injury by which the family are deprived of the means of support, as the deceased person himself, if he survived the injury, would, according to the extent of it, be deprived of the ability to contribute to their support. If Mr. Beach were maimed and mutilated by this explosion, and survived the accident, he certainly would, by the common law, have a right of action for damages against the defendants, whether it occurred within this State or not. The action would be undeniably transitory. Do these acts, in their remedial features, go any further than to extend and transmit this common law right, giving compensation, for the injury that produced the death, to the family and representatives of the deceased?

For these reasons I hold that this action is well brought, even on the assumption that the explosion occurred without the territorial limits of the State of New York.

#### Chicago and North-Western Railroad.

A few days since the old Board of Directors of the now defunct Chicago, St. Paul and Fond du Lac Railroad Company met in their office and executed conveyances to the purchasers for the bondholders, also ratifying the sale and transfer, and by their own action ceased to exist as a board. Immediately afterwards the new proprietors convened and proceeded to organize the concern under the new name of the Chicago and North-western Railroad Company. The following gentlemen were elected officers: Wm. B. Ogden, Esq., President; Perry H. Smith, Vice President; E. W. Hutchings, Treasurer; Geo. P. Lee, Assistant Treasurer at Chicago; Charles Butler, Secretary; and J. B. Redfield, Assistant Secretary at Chicago; G. L. Dunlap, Superintendent; J. F. Strong Assistant Superintendent.

A Board of Directors was elected, but they will be subjected to changes, and are not considered permanent. The Board had awarded the contracts for the building of the gap in the line from Janesville, Wis., to La Crosse Junction. It is fully expected that this part of the road will be finished by the first of December.

#### Dayton and Toledo Railroad.

The Dayton and Michigan Railroad have now some sixteen miles' track laid on the northern end of the road, and a sufficient force of men are at work laying the iron as fast as possible. On the 1st instant track-laying was commenced at the Lima end, and several miles are already finished toward Toledo. Should no serious delay occur, the whole line will be open from Cincinnati to Toledo by the middle of August next.

## TREATISE

### ON THE PRINCIPLES OF CIVIL ENGINEERING AS APPLIED TO THE CONSTRUCTION OF WOODEN BRIDGES.

By S. S. Post, Civil Engineer,  
And late Chief Engineer of the N. Y. & Erie R. R.

(Continued from p. 372.)

§ 101. It is apparent that the ultimate strength of a bridge may depend materially upon the stability of the piers or abutments by which it is supported; and some further observations upon the bulk and weight of materials employed for that purpose, and upon the composition and tenacity of mortars used to cement them, will not be inappropriate in connection with the subject of their superstructures.

§ 102. Mortars used in the formation of bridge masonry in this country, are usually composed of lime and sand, in various proportions intimately mixed, and a sufficient quantity of water to give the mass the consistency of a paste and to adapt it to convenient application with a trowel.

§ 103. White marble (*carbonate of lime*) submitted to a strong red heat until its water and carbonic acid are thoroughly expelled, becomes pure *quick lime*. If a certain quantity of water be poured upon lime-stone recently calcined, it heats, crumbles in pieces, its bulk increases to twice or three times its original volume, the water combines with the lime, in the proportion of about one part of water to three parts of lime and the whole becomes a fine white powder. This powder is the hydrate of lime, but is more generally known as *slaked lime*, *fat lime*, *common lime*, or simply as *lime*.

If pure lime be reduced to a paste with water, or with fine sand and water, and exposed to the air, it will set or become solid, and will afterward resist the action of water. But if the paste be placed in water, or in very humid earth, it will remain soft, and, in that position will never be of any value as a cement.

§ 104. The product of another kind of limestone will be about four parts of pure lime, two parts of silica (*faint, quartz*) and one part of alumina (pure clay).

Lime-stones of this composition, though calcined do not readily slake when moistened, but, if ground to powder, they absorb water without producing heat or augmenting their volume.

This powder when made into a paste, either with or without sand, will, in a few days, become solid and tenacious in water or moist earth, but in the air will not acquire so much hardness or tenacity. Limes which possess this singular property of hardening under water have received the names of *hydraulic lime*, *hydraulic cement* or simply *cement*.

Generally, for bridge masonry in this country, mortars are made of lime and sand, or of cement and sand, or of cement, lime and sand.

§ 105. Pure carbonate of lime, such as is derived from Iceland spar, or Carrara marble, is rarely used in the arts.

That which is commonly employed, and which is derived from ordinary limestones contains more or less silica, alumina, oxide of iron and some-

times oxide of manganese and carbonate of magnesia, and partake, to a greater or less extent, of the peculiar properties of hydraulic lime.

§ 106. *Common lime mortar.* To make this mortar, fresh quick lime of the best quality should be procured and broken to pieces not larger than walnuts. These should be spread and wet evenly with one-third to one-half their bulk of water. When completely slaked, add just enough water to make a stiff paste. To this paste add the requisite proportion of fine, sharp, clear sand. Temper with water and mix these elements thoroughly in a mortar mill, or by other means.

The proportion of sand will depend upon the use to be made of the mortar. *The less sand used the stronger will be the mortar.*

If paste and sand in equal parts are mixed, the mortar will have a tenacity in six months of about 20 lbs. per square inch, and in four years about 40 lbs. per square inch. Varying the proportions of paste and sand, the strength of the mortar will be increased or diminished nearly as follows:

Sand $\frac{1}{2}$ ....	tenacity 20 to 40 lbs. per square inch.
" 0.2 ....	" 12 $\frac{1}{2}$ per cent. greater.
" $\frac{1}{4}$ ....	" 10 " "
" $\frac{1}{2}$ ....	" 15 " " less.
" $\frac{3}{4}$ ....	" 25 " " "
" 0.8 ....	" 30 " " "

§ 107. When the stability of a structure like a pier or an abutment of a bridge, depends upon the tenacity with which the stones or bricks composing it are held together by the mortar used to cement them, very little sand should enter into the composition.

When no lateral pressure exists, and the beds of the stones are rough, and the joints necessarily large, economy may dictate the use of three or four parts of sand to one of lime.

Mortars of quick lime and sand to be used in the air, sometimes may be materially improved by the addition of hydraulic lime, or of calcined clay.

§ 108. *Cement mortar.*—To make hydraulic lime mortar, the lime-stone, on being properly calcined, should be ground to a fine powder and immediately put in air-tight barrels, or in some other manner be secured from the atmosphere until it is to be prepared for use.

The degrees of hardness and of tenacity which hydraulic mortar will acquire, depend much upon the proportion of lime and sand, their intimate mixture and the quantity of water in the composition.

As a general principle a mortar made of hydraulic lime will be weakened if any sand be added; but the strength of a mortar composed of one part of sand and two parts of hydraulic lime will not be sensibly less than that of hydraulic lime alone.

When the cement is not required to be the strongest that can be made, equal parts of hydraulic lime and sand may be used without any great diminution of tenacity. For many purposes the quantity of sand may be economically extended to two or three parts to one of lime.

The cements from Rosendale, Kingston and other localities of Ulster County in the State of New York have been extensively used and are widely known. When calcined, these cements contain, according to an analysis made by Dr. Beck,—

Carbonic acid .....	5.00
Lime .....	87.60
Silica .....	22.75
Alumina .....	13.40
Magnesia .....	16.65
Per-oxide of iron .....	3.30
Gas, etc. ....	1.30
	100.00

The tenacity of mortars made from this cement, allowing them one year to harden in water, may be estimated as follows:

	Per square inch.
Cement without sand .....	45 lbs.
" 2 parts, " 1 part .....	40 "
" 1 " " 1 " .....	30 "
" 1 " " 2 " .....	15 "

§ 109. Bricks are probably the lightest materials used for bridge masonry.

Only the best burned, and hardest bricks are at all suitable for this purpose.

These will weigh about 130 lbs. per cubic foot.

A brick pier of the dimensions given in section 100 (*Fig. 71*) contains 15,416 $\frac{1}{2}$  cubic feet and at 130 lbs. per cubic foot will weigh 2,004,167 lbs., requiring a horizontal force of 300,625 lbs. applied at A to overturn it.

To resist a further horizontal force at A of 228,575 lbs., will require an adhesion at its base of 1,528,833 lbs. equal to 2,902 lbs. per square foot or 20 $\frac{1}{2}$  lbs. per square inch.

Then the resistances of a brick pier instead of the solid granite one will be, from weight of pier .....

..... 300,625 lbs. from weight of superstructure .....

..... 48,360 " from adhesion of mortar at the base .....

..... 228,575 " Total .....

..... 577,560 lbs.

§ 110. It will seldom happen that a substratum of solid rock will be found, upon which to build a pier, so that any reliance can be had upon the adhesion of mortar at the base.

Where a foundation is obtained by driving a great number of piles to a considerable depth, some dependence might be put in anchors of strong bars of iron secured to the piles at one end and within the body of the masonry at the other end, as a substitute for cement between the foundation rock and the base of the pier.

In nearly every case that will occur, however, the dimensions of the masonry should be such that when its materials are properly cemented together its weight alone will be sufficient to resist any force which can be brought to act against it.

§ 111. Instead of one-tenth *batir* to the sides of the pier, if it be increased to a tenth and a half, or 0.15, the height being 50 feet and the top surface 5 by 25 feet, it will contain 21,250 cubic feet, and, at 130 lbs. per cubic foot, will weigh 2,762,500 lbs.

The base of the pier will be 20 feet, consequently the arms of leverage will be 50 and 10 feet, and  $2,762,500 \times 10 = 552,500$  lbs., will be the horizontal resistance at the top.

Adding the weight of the superstructure, as before, to the weight of the pier, the total horizontal resistance will be 600,860 lbs.

Dividing this pier by a horizontal plane at half its height, the upper portion will contain 8,406 $\frac{1}{2}$  cubic feet, weighing 832,812 lbs. and will have a base 12 $\frac{1}{2}$  feet wide. Then  $\frac{832,812 \times 6.25}{25} = 104,101$

lbs. will be its resistance to a horizontal force applied at the top.

To enable the upper portion of the pier to resist the horizontal force of 552,500 lbs. at the top, it must act, not only by its own gravity, but must have the aid of the gravity of the lower portion by being connected to it with a tenacity of 1,377,188 lbs. equal to 3,390 lbs. per square foot of the horizontal section or  $28\frac{1}{2}$  lbs. per square inch.

Again dividing this pier horizontally, 10 feet below the top, the upper portion will contain 1,730 cubic feet, weighing 224,900 lbs. and will have a base 8 feet in width.

The horizontal force this portion of the masonry can resist is  $\frac{224,900 \times 4}{10} = 88,960$  lbs.

To resist a force of 552,500 lbs., it must be cemented to the lower portion with an adhesion of 1,156,350 lbs. or 5,162 lbs. per square foot, equal to 35.8 lbs. per square inch.

Similar calculations upon other sections of the pier at various heights will establish the fact that the strength required of mortar will increase from the bottom to the top in proportions depending upon the dimensions of the masonry.

§ 112. An embankment of earth forming an approach to a bridge, has a tendency to push the abutment forward or to turn it over. It will be well to inquire how far this tendency may counteract that of the arch or truss, to thrust outward.

If the embankment were not retained by the wall, the particles would loosen and slide, or tumble down, until there would be formed a certain inclination of surface called the *natural slope*, or *plane of repose*.

The plane of repose is perpendicular for solid rock. It is inclined to a vertical plane, about 35 degrees for very compact earth; 45 degrees for an average of soils; 55 degrees for an average of fine dry sands, and the inclination continues to increase, as the material has less cohesion and friction, until the limit of fluidity is attained, when the surface becomes horizontal.

A column of water presses with as great force laterally as vertically, on account of the constituent particles having an absolute freedom of motion among each other, without friction and without tendency to cohere.

The pressure of earth upon a wall is similar to that of water, with this difference, that the weight must be reduced by a certain ratio dependent upon the friction and cohesion of the material.

A column of sand would produce a horizontal pressure equal to its weight were there a total absence of friction and cohesion between its particles. Or, if the exact force required to overcome the resistance of friction and cohesion could be ascertained, then the difference between that force and the weight of the material would make known the quantity of force left free to act like a fluid.

Friction is the resistance opposed to the motion of one body upon the surface of another, when the two are *pressed* together, and the quantity of friction for each kind of material is directly as its weight.

The measure or *co-efficient* of friction, is the proportion of the weight of a body expended in overcoming its friction, and is determined by the inclination of the surface when it is just sufficient

to keep up the state of motion which the sliding body may have received, but of not sufficient inclination to cause the body to pass from a state of rest to a state of motion. The inclination of a surface under such conditions, is called the *angle of friction* or the *limiting angle of resistance*.

Cohesion is manifested by the force necessary to produce fracture or any other derangement of the form of a body. The force by which the particles of a body resist separation is estimated by the weight required to tear asunder those particles at any given surface.

The cohesion of timber and iron (§ 12) is ascertained by suspending a rod, of known dimensions, by one end and attaching weights at the other end until it breaks. A similar rod, composed of sand, clay or other earth, may be supposed to be suspended. If of any considerable length, it will break of its own weight. The weight of the greatest length of rod which will remain suspended without breaking will measure the cohesion of that material.

The following are the results of some experiments to determine the natural slopes of different soils, which have been published by various authorities.

*Natural Slopes of Soils.*  
Slope. Angle with

Kinds of Earth.	Horizontal.	Horizontal.	Perpendicul.	Perpendicul.	Authority.
Sand, very fine.	5	3	31°	59°	Martony.
" fine dry.	5	3	31°	59°	Gadrof.
" river, very dry	3	2	33°	57°	Delanges.
" dry yellow.	3	2	34°	56°	Hope.
" fine, very dry.	7	5	34°	55°	Rondelet.
" lightest kind.	5	4	39°	51°	Barlow.
Soil, perfectly dry.	5	4	39°	51°	Martony.
Gravel.	4	3	37°	53°	Hope.
Loose shingle perfectly dry.	5	4	39°	51°	Pasley.
Soil, moist.	10	9	43°	47°	Martony.
Ordinary earth, very dry.	9	10	47°	43°	Rondelet.
Do. slightly humid.	5	7	54°	36°	Rondelet.
Do. very compact.	5	7	55°	35°	Barlow.

It is found on removing the support of a mass of earth that a portion of the prism above the plane of natural slope, will separate from the other portion of the prism, and tumble down, and that afterwards the remaining portion of the prism will slide. The line of separation between the two portions of the prism is called the *line of rupture*.

M. COULOMB, M. DE PRONY, M. GOUTHEY, and other French Engineers, have adopted the theory that the line of rupture bi-sects the angle between the vertical and the natural slope of the earth. Indeed they have demonstrated that such ought to be the fact, and that the portion of the prism between the line of rupture and the natural slope, represents the resistance of friction and cohesion, while the portion of the prism between the vertical and the line of rupture, is left free to act against the wall.

The scope of this work does not admit of giving the solution of this problem, which requires the application of the calculus; but the following practical rule may be deduced from it, for finding the pressure against a wall.

4. Find from a table of natural tangents,

otherwise, the natural tangent of half the angle between a vertical line and the natural slope.

2. Multiply together the square of the natural tangent; the square of the height, and the weight of a cubic foot of the earth; divide the product by 6, and the quotient will be the pressure at the top of the wall, for each lineal foot.

In all cases the top of the wall is here supposed to be level with the top surface of the embankment.

EXAMPLES.

1. Required to know the horizontal force exerted at the top of a wall 50 feet high, by an embankment of very compact earth, weighing 120 lbs. per cubic foot, and having a natural slope of 35° with the vertical.

The half-angle is 17½° and its natural tangent 0.3153. Then—  

$$0.3153 \times 0.3153 \times 50 \times 50 \times 120 = 4,970.7 \text{ lbs.}$$

If the length of the wall be 30 feet—the average length of the pier, § 100—the total tendency to overturn it will be—

$$4,970.7 \times 30 = 149,121 \text{ lbs.}$$

2. The wall 50 feet high. Embankment of gravel weighing 120 lbs. per cubic foot, and natural slope 53°.

Half angle 26½°. Natural tangent 0.4986. Then  

$$0.4986 \times 0.4986 \times 50 \times 50 \times 120 = 12,430 \text{ lbs.}$$

Or against a wall 30 feet in length—

$$12,430 \times 30 = 372,900 \text{ lbs.}$$

3. Wall 50 feet high. Embankment vegetable earth weighing 62½ lbs. per cubic foot.

Natural slope 53° 8'.

Half angle 26° 34'. Natural tangent 0.5.  

$$\text{Then } 0.5 \times 0.5 \times 50 \times 50 \times 62\frac{1}{2} = 6,510\frac{1}{2} \text{ lbs.}$$

4. Wall 50 feet. Embankment water. Weight per cubic foot 62½ lbs. Natural slope 90°.

Half angle 45°. Natural tangent 1.  

$$\text{Then } 1 \times 1 \times 50 \times 50 \times 62\frac{1}{2} = 26,042 \text{ lbs.}$$

5. Height of wall 50 feet. Embankment of solid rock weighing 150 lbs. per cubic foot.

Natural slope 0°. Half angle 0°. Natural tangent 0.

Then  $0 \times 0 \times 50 \times 50 \times 150 = 0.$

(To be continued.)

*Terre Haute and Alton Railroad.*

The annual meeting of the stockholders of the Terre Haute, Alton and St. Louis Railroad commenced at Shelbyville on Monday, and on Tuesday, under a compromise between the contending parties, the following gentlemen were elected Directors by a unanimous vote: Edwin C. Littlejohn, of New York, John Stryker, J. S. Haywood, N. Hanson, Robert Smith, John P. Usher, William D. Griswold, H. Messer, T. A. Marshall, Anthony Thornton, William Mattoon, Caleb Rice, B. B. Sutherland. In the evening, W. D. Griswold, of Terre Haute, was elected President, after which the Board adjourned to meet at Terre Haute on Thursday.

*Engineer of the Sault Canal.*

Joseph B. Walton, Esq., of Grand Rapids, has received the appointment of Engineer of the Sault Ste. Mary's Ship Canal. Mr. Walton has been long connected with the Pennsylvania canals, and is a gentleman of capacity and experience. The appointment is rendered necessary, in order properly to carry on the work of repairs.

*Cincinnati Stock Sales.*

By KIRK & CHERVER.

For the week ending June 18, 1859.

BONDS.	Per cent.
Little Miami, 1st Mort.	68—83
Covington and Lexington, 2d Mortgage	68—80
Cinc., Ham. and Dayton, 2d Mortgage	78—85
Indianapolis & Cincinnati, do.	78—85
STOCKS.	
Cincinnati, Hamilton & Dayton	62½
Columbus and Xenia	83
Indianapolis & Cincinnati	51
Little Miami	34

*Railroad Earnings.*

The business of the Baltimore and Ohio Railroad for May was as follows:

*Main Stem.*

Passengers	\$53,367.51
Express	4,442.09
Mails	8,250.67
Tonnage	275,569.85

*Washington Branch.*

Passengers	\$25,654.91
Express	1,300.00
Mails	1,000.00
Tonnage	6,806.03

*North-western Virginia.*

Passengers	\$3,184.85
Express	866.67
Mails	.....
Tonnage	17,516.95

Total ..... \$397,959.53  
Compared with the same month of last year, the following result is shown:

May, 1858.	May, 1859.	Increase.
Main Stem. \$329,937.77	\$311,630.12	\$11,691.35
N. W. Virg'a 25,310.32	21,568.57	*3,750.85
Wash. Br'h. 42,511.99	34,760.94	*7,751.04

Total .. \$397,770.07 \$397,959.53 \$189.46

\* Decrease.

Showing a decrease on the North-western Virginia and Washington branches, but an increase on the Main Stem, which leaves a total increase of \$189.46. The increase is in the tonnage department, and derived principally from the coal trade, of which 40,464 tons were transported in the past month, against 23,563 tons for May, 1858.

The financial year of the company commenced with October. The receipts of the first eight months of the present year compare with those of the previous year as follows:

1858	1857
October ..... \$392,503.02	\$396,191.85
November..... 383,159.22	381,443.38
December..... 336,861.01	379,159.02
1859	1858
January..... 327,176.63	317,513.73
February..... 321,391.10	277,044.49
March..... 410,061.21	439,061.02
April..... 369,067.33	483,558.45
May..... 397,959.53	397,770.07
Total ..... \$2,933,174.96	\$3,054,842.01
In 1857 ..... 3,054,842.01	

Dec're se pres't year. \$117,669.96

The earnings of the Buffalo, New York and Erie Railroad Company for the month of May, 1859, are as follows, for main line from Buffalo to Corning, 42 miles:

Passengers	\$11,842.44
Freight	24,290.83
Other resources	1,540.17

Total ..... \$37,678.99

The following are the May earnings of the Norwich and Worcester Road:

In 1859 .....	\$27,628.88
In 1858 .....	23,500.30

Increase..... \$4,129.58

The earnings of the Stonington Railroad in May, 1859, were .....	\$21,789 22
May, 1858, were .....	16,613 94
Increase .....	\$5,175 28
The May earnings of the Brooklyn City Railroad were .....	\$42,376 09
May, 1858, were .....	34,278 46
Increase .....	\$18,137 68
The receipts of the Morris Canal have been:	
Total to May 28, 1859 .....	\$59,843 59
Total end'g June 4, 1859. 10,861 50—\$70,715 09	
Total to May 29, 1858 .....	42,132 45
Week end'g June 5, 1858. 8,783 91—50,916 36	
Increase, 1859 .....	\$19,798 73
The May receipts of the Macon and Western Roads were:	
In 1859 .....	\$21,810 36
In 1858 .....	20,904 06
Increase .....	\$906 30
The May receipts of the Michigan Central Road were:	
May, 1859 .....	\$127,145 77
May, 1858 .....	185,727 01
Decrease .....	\$58,582 24
In the year ending May 31, the receipts have been:	
1859 .....	\$1,838,138 67
1858 .....	2,428,758 52
Decrease .....	\$590,619 35
The earnings of the Central Railroad Company of New Jersey for the month of May, 1859, were .....	\$84,136 31
For the same month last year .....	72,978 36
Increase 15 per cent .....	\$11,157 95
The earnings of the Cleveland, Columbus and Cincinnati Railroad Company in May were:	
Freight .....	\$41,535 88
Passengers, mails, and express .....	35,422 67
Rents .....	6,081 29
Total .....	\$82,039 85
Earnings in May, 1858 .....	82,968 26
Increase .....	\$71 59
The receipts of the Grand Trunk Railway of Canada for the week ending May 28, were .....	\$41,833 83
Week ending May 29, 1858 .....	41,628 45
Decrease .....	\$205 37
Total traffic from July 1st .....	\$2,078,333 90
Same period last year .....	2,169,476 13
Decrease .....	\$91,142 23
The traffic of the Great Western Railway of Canada for the week ending June 3rd, \$859, was as follows:	
Passengers .....	\$22,387 86
Freight and live stock .....	7,883 95
Mails and sundries .....	1,436 40
Total .....	\$31,707 71
Corresponding week of last year .....	36,554 71
Decrease .....	\$4,847 00

**Scott County Bonds.**

The Davenport (Iowa) *Gazette*, of the 1st inst., states that the day before, Judge Dillon gave his decision in the case of Young Stokes *et al.* vs. Scott County, on an injunction applied for by Judge Grant to restrain the county issuing bonds to the amount of \$275,000, voted by the people for the building of the Cedar Valley Railroad. The

decision overruled all of Grant's positions, and the application was refused.

**American Railroad Journal.**

Saturday, June 18, 1859.

**Fluctuations in Railroad Property.**

The brilliant period in the history of our railroads, in which success seemed to be the law of these enterprises, and in which the example of the most fortunate was taken as the rate for all, has passed. A law appears to have followed the progress of these enterprises in every portion of the country. They have all had their phases of apparent extraordinary success, succeeded by extraordinary reverses. One has only to look back a short time, comparatively, to a period when the Harlem, Long Island, Morris Canal and Stonington were the prime favorites in this market, and were eagerly sought for at large premiums. The golden period in Massachusetts for its railroads was from 1844 to 1848 and '49, during which nearly every road in the State paid dividends ranging from 8 to 12 per cent., with earnings increasing so rapidly as to forbid the idea that the proportion between these and capital could ever be less. These extraordinary successes led to the legitimate consequences—extraordinary expenditures—many of which were prompted by no other motive than to relieve an overflowing treasury, and to tax wasteful and irresponsible systems of management. The end was a rude awakening of the companies from their dream of prosperity, to find themselves compelled to forego, and in many cases entirely, their accustomed dividends. The market value of the stock fell, in many instances, fifty and seventy-five per cent, while the favorable feeling with which these works had been viewed, was entirely changed.

The same thing has been repeated in the West, on a much larger scale, and with a recoil still more disastrous. Some of the roads in that section of the country returned, in a very few years, a large portion of the capital invested in them. The West, with its broad plains so favorable to their construction, and with its vast products, which derived their value from the existence of these works, seemed to be the very field in which they were to display their highest usefulness and value. Dividends were frequently paid to the amount of 20 and 30 per cent. each year. No one for a time ever dreamed that a reverse could come to this picture. It came, and hardly left a paying road among them all. Some that were supposed to be the best, and strongest, have turned out the most disastrously, and shares that yielded annually 10 or 20 per cent., are now selling for a sum smaller than a single dividend.

These contrasts seem a necessary law, universally attendant upon the progress of railroad enterprises. There are many reasons why it should be so. The early roads are built at a very low cost. They have the monopoly of their business. High rates of charges rule. Being new, they can be run for several years with slight repairs. But all these are temporary conditions, and do not present a true picture. They are often designedly and exclusively exaggerated, for the purpose of inflaming the public with a desire to possess securities that yield such extravagant returns. The charge for the lease in the meantime is steadily

going on. The cost of the road rapidly increases. Its traffic becomes shared with similar works. A fancied prosperity has destroyed everything like economy, or a sense of accountability. The parties having the road in charge come to regard it very much as their own property, in everything but looking after it properly. The result is that the dividing line between what appeared to be extraordinary prosperity, and the entire absence of it, is not an imperceptible boundary, but a *precipice*, as in the case of the Rock Island. This company could not well get rid of their surplus, with which its treasury groaned, but by an extraordinary dividend. It was paid—the last one that has been paid, we believe, and certainly the last that is likely to be for some time to come. By a bit of sharp practice, which has characterised the managers of this concern, the bondholders were not allowed to share in this feast. But they were not to be caught again in this way, so they rushed to convert their bonds, since which their investment, we believe, has produced them *nothing*. These violent alternations are not peculiar to our own country. They have been as excessive in England as in the United States. The railroads of other countries will pass through a similar transformation, though not so disastrous, from the fact that the right to build them is only sparingly dealt out.

The consequences that result from these violent changes are terrible. The failure of a railroad takes bread away from thousands—the failure of a large number from *millions*. It is now too late, in many cases to do more than to correct the mistakes and reverses that have been committed. In such, economy, faithfulness, capacity and integrity can do much to repair the losses that have been suffered. The railroads of Massachusetts have for years past been steadily recovering the ground they lost. Nearly all the roads having any merit, are resuming the payment of dividends, upon a basis that bids fair to increase rather than diminish them.

The same thing must be attempted elsewhere, and a similar result can be made to follow. Such companies as are commencing operations, or have not yet passed through the extremes of inflation and collapse, should take care never to take a step that cannot safely be followed by another of the same kind, and remember that railroads are subject to a law that controls all commercial transactions.—That only by the most prudent and competent management can a moderate degree of success, in the average, be achieved.—That excesses of every kind will be followed by a corresponding recoil.—That a road cannot afford to lose a penny, and that extraordinary earnings should never, till their continuance be well established, be made the basis of extraordinary expenditures or dividends, and that excessive earnings are often the most fatal thing that can befall a company. Let the safe means be taken, and if unusual heights are not reached, unusual depressions will be avoided. A road so managed will never be the means of deceiving its owners or the public, but will do all it is capable of doing for both.

**Nashville and North-Western Railroad.**

The citizens of Nashville recently voted a subscription of \$273,000 to the Nashville and North-Western Railroad, payable in three yearly installments. The proposition carried by a vote of 1,280 to 769.



**The Competition Question.**

This vexed question seems to have been disposed of for the present. It is to be hoped, for some time. In three months more, if the interior is favored in respect to its crops, an enlarged traffic will be the best security that the prices at present agreed upon will be maintained, if not advanced.

In reference to the new arrangement, we copy the following letter from Mr. Moran:

OFFICE OF THE NEW YORK AND ERIE R. R. CO.,  
NEW YORK, June 13, 1859.

*Samuel L. M. Barlow, Esq., New York:*

DEAR SIR: I have to acknowledge receipt of copy of an agreement between Messrs. Corning and Thomson, and the basis of an agreement between the four lines, by which rates of transportation and passenger fares have been, or are to be raised.

This company will conform to this agreement as long as their competitors adhere to it, but I feel it due to the interests I represent, to protest once more against the ruinously low rates forced upon us by the New York Central Company on Westward-bound third and fourth classes, as well as on flour and other Eastward bound freights. I cannot understand why Eastward-bound freights should be left at nearly the lowest rates established during the late ruinous contest. The rate of 37½ cents per bbl. on flour from Buffalo to New York is totally inadequate. Last year, the difference between canal and rail rates was 10 cents per bbl., while at the present rates it is less than 5 cents above canal rates. One hundred and twenty bbls. of flour weigh 13 tons, and yield to the companies \$45 for a distance of 450 miles, say equal to 4 cent per ton per mile. Will any intelligent railroad manager say that this is an adequate compensation, particularly when the transportation requires a transhipment, thus requiring the company to pay twice for loading and unloading? Coal in large quantities is considered a losing traffic at 1 cent per ton per mile, although loaded and unloaded by the owner, and not subject to damages. It may be said that the New York Central Company transports flour between Albany and New York by the more economical river route. In that case we must deduct 5c. for river transportation, and it will leave to that company \$39 for 13 tons for 300 miles—say precisely 1c. per ton per mile. It appears to me that it would be far better to allow the canal to monopolize the entire flour traffic, rather than to transport it by rail at this low rate. In regard to Western-bound rates, our General Freight Agent, Mr. Oatman, our Agent in Broadway, and many Western Railroad Agents, say that it would be as easy to obtain \$1.20 for first class, and 50c. for fourth class from New York to Cincinnati, as the low rates established, which on fourth class are only nominally advanced.

The difference between 42c. and 50c. on fourth class is 20 per cent. on the gross, but on the net income it must exceed 100 per cent., which will explain the importance I attached to the subject. Our Agents are as eager as the New York Central managers to secure freights, and they generally lean toward low rates rather than high, so that I cannot be accused of wishing others to adopt my own views. It is to me very evident that it would be far preferable for all parties to carry one-half the tonnage at a profit, rather than double the tonnage at first cost.

If it be kept in mind that the new rates are nominally the same on the entire Eastward bound freights, except wool, and on Westward-bound third and fourth classes, as during the late contest, it will be seen that about three-quarters of the entire freight traffic will continue to be done at ruinously low rates. If this is to continue until next winter, the loss to all the parties in interest will be very great. I hope, however, wiser views will ere long prevail, and rates be once more restored to a remunerative standard.

Believe me, respectfully yours,  
CHARLES MORAN, President.

We hope abundant crops will come to the rescue of all the roads. In reference to prices, we suppose the Central placed freights as high as it could, and retain the business. It has, of course, the same interest in the matter with the Erie, and much better opportunity of determining the precise figure that will keep the business from the canal. As Mr. Oatman is referred to as authority in favor of higher rates, it may be proper to state that he is largely interested in the American Transportation Company, doing business on the canal, and his opinion may possibly be influenced by his interests—high rates there being necessary to make his stock productive.

**Galena and Chicago Railroad.**

At the annual meeting of the stockholders of the Galena and Chicago Union Railroad Company, held in this city recently, the following gentlemen were elected Directors for the ensuing year: William Larned, New York; Walter L. Newberry, William H. Brown, Flavel Mosely, John Wentworth, Jason McCord, Orrington Lunt, Francis B. Cooley, E. K. Rogers, Jonathan Burr, Chicago; Thomas D. Robertson, Rockford; Charles S. Hempstead, Galena; Dexter A. Knowlton, Freeport.

Of the above, William Larned received 27,910 votes, John Wentworth 27,924, Jason McCord 27,934, and Jonathan Burr 27,569: all the rest received 28,035. There were 438 votes cast for H. T. Dickey, 142 for Charles Walker, 41 for John B. Turner, and 28 for B. W. Raymond.

Before the balloting commenced, Mr. Turner, President of the Company, stated that he had some time ago tendered his resignation, to take effect at this date. He had no disposition to recall it, or to enter into a contest for re-election, and that he and his friends had no ticket to present.

Mr. Larned, of New York, addressed the meeting on behalf of New York shareholders, disclaiming any personal feeling on their part against any of the gentlemen composing the old board, especially in reference to Mr. Turner. But a difference in their respective views of the interests of the road, and the proper policy to be pursued the coming year, suggested a change of administration. He tendered the thanks of the New York shareholders to the members of the retiring board.

The voting then commenced, the result being as stated above. Captain Turner and his friends, we understand, held stock and proxies to the amount of sixteen thousand shares, but the majority being strongly against them, they cast no votes.

The election of the above board, it is understood, secures the early construction of the bridge at Clinton, and a close running connection with the Chicago, Iowa and Nebraska Railroad, now completed to within a short distance of Cedar Rapids. In fact, this is the point on which the election turned, and the occasion of Mr. Turner's withdrawal from the Presidency.

Captain Turner has been identified with the Galena and Chicago Union Railroad from the beginning. To his energy and indomitable perseverance are the people of the city and of the country through which it passes in great part indebted for its construction; and however much they may differ with him on the question of policy which has resulted in a change of administration, he will pass from his public position with no abatement of the high respect and good-wishes of the public.—Chicago Press.

**Cincinnati, Wilmington and Zanesville R.R.**

The Cincinnati Commercial states that a contract for building the line from Morrow Junction to Glendale, on the Cincinnati, Hamilton and Dayton road, has actually been taken by John H. Barnes, Esq., of Baltimore. Mr. B. is one of the bondholders in the C. W. & Z. Co., and has represented the second mortgage bondholders in the recent suits before the U. S. Courts.

**Production of Copper in the United Kingdom.**

1.—Mines, Ores raised, and Fine Copper Produced, 1856.

LOCALITIES.	Number of mines worked.	Tons (2,000 lbs.) of ores raised.	Tons (2,000 lbs.) fine copper produced.
Cornwall	135	183,857	12,089
Devon	23	47,067	3,138
Cumberland	5	4,388	293
Anglesea	2	2,688	178
Caernaroon	2	1,752	117
Cardigan	6	182	12
Radnor	2	116	8
Total England & Wales	175	240,044	15,765
Cork	3	6,886	686
Tipperary	1	496	89
Waterford	1	4,466	448
Wickford	6	1,097	68
Galway		36	1
Total, Ireland	11	12,981	1,292
Isle of Man	1	35	2
Sundry districts not included in the above.. .		151,609	10,108
Total United Kingdom	187	404,592	27,167
Value in £ stg.. .		1,744,516	2,983,611
Value in dollars.. .		8,722,580	14,918,055
2.—Results of 1854, 1855, and 1856 compared.			
1854.	1855.	1856.	
Mines worked, No.	151	165	187
Ores raised, Tons.. .	333,744	359,470	404,592
Metal prod'd " .	22,286	28,849	27,157
Value of ores... \$7,419,030	8,201,945	8,772,580	
Value of metal.. .12,436,875	15,214,385	14,918,055	
3.—Fine Copper Produced 1821-1856.			
Tons.		Tons.	
1821	11,492	1839	16,425
1822	12,340	1840	14,582
1823	10,840	1841	14,092
1824	10,869	1842	15,218
1825	11,601	1843	14,927
1826	12,424	1844	16,620
1827	13,805	1845	16,668
1828	13,650	1846	16,792
1829	13,503	1847	16,433
1830	14,819	1848	16,486
1831	16,472	1849	15,232
1832	18,184	1850	16,464
1833	14,801	1851	16,016
1834	15,732	1852	18,629
1835	16,206	1853	19,429
1836	16,542	1854	22,286
1837	11,368	1855	23,849
1838	14,078	1856	27,167

**Muscogee Railroad.**

The operations of this company for the past six months, says the Columbus Times, have been successful beyond precedent in its history, and its present condition challenges comparison with any road of equal cost or proportionate capital in the Southern country. Its road bed is in excellent order, and its superstructure has been, almost entirely, renewed within the last two years. In the prospect of a speedy and continued increase of business, it stands without a rival. The Mobile and Girard Railroad, its present great feeder, is being rapidly pushed towards Union Springs, which place it will reach in the coming fall. Beyond that point, in Pike county, Ala., its extension is now being energetically prosecuted, and within eighteen months from to-day the richest cotton growing country in Alabama will be successfully tapped. We learn from perfectly reliable authority that this company, having paid its last semi-annual dividend to the stockholders, and the interest upon preferred stock, has paid the interest upon its bonds up to this date, and its profit and loss account now shows an unappropriated balance of something over one hundred thousand dollars.

more than fifteen per cent. on the general stock. If there is another road in the South that can show a condition of greater prosperity, we should like to know it.—*Savannah Republican*.

#### Street Railroads.

Street Railroads are now all the rage, and for that reason they will be seized upon as a means of fleecing the unwary public by a class of men trained to take advantage of any great impulse or movement, and to convert a popular enthusiasm in hard dollars for themselves. In New York this has been done on a magnificent scale. For instance—the Third Avenue Railroad Company state the cost of graduation and masonry of their road to be \$166,000 per mile; the Sixth Avenue, \$138,000 per mile. As the grade of the streets is adopted in all cases, it will be seen that these items are very nearly a pure fiction. The modus operandi is this. A party in New York get a grant for a railroad. Their object is to swell its cost, as represented by its securities, to the greatest amount possible, so that for every dollar paid in, they may divide four or five in stock and bonds. If, as has been the case in New York, the roads should turn out to be productive, the securities issued to them for four times the *actual* cost of the roads are worked off on the public at their nominal value the difference between the two sums being the profit of the transactions.

Now as all our large towns are rushing into City Railroads, it would be well for them to bear in mind the example of New York, otherwise they will find themselves most egregiously imposed upon. Their roads will be made the means of imposing a tax upon transportation of their people twice as great as it should be, and enriching sharpers and speculators at the public expense.

#### Extension of North-Eastern Railroad to the Coalfields.

During the past week we had the pleasure of accompanying Mr. S. S. Solomons, Engineer in Chief, and General Superintendent of the North-Eastern Railroad, under whose superintendence the survey of the Cheraw and Coalfields Railroad is being made, over the country as far as Carthage, going on the western and returning on the eastern side of Pee Dee. We were pleased to find a lively interest manifested for the enterprise everywhere. It is an important road to the Cheraw and Darlington and the North-eastern Railroads, to Charleston, and to a large section of North Carolina, and especially to the Raleigh and Gaston and Raleigh and Beaufort Railroads. It will open up one of the finest and most productive agricultural sections of the State, to say nothing of the vast dormant mineral resources to be developed. The road as soon as completed, if properly located, would have a local business that would pay on the investment.

To the many friends of the road we can say with confidence, that the survey now being made by Mr. Solomons, when completed, will display the many advantages and disadvantages of the several routes, in a manner entirely reliable. His thorough knowledge of his profession, and long practical experience, are guarantees for the faithfulness of the work, upon which all may rely with the utmost confidence. Therefore, until his report is laid before the public, it is worse than idle to speculate upon the results of the survey.—*Cheraw Gazette*.

#### Bedford Railroad.

Twelve miles of the new railroad between Bedford and Broad Top were let on Wednesday last. The contract was awarded to Collins, Dull & Co., at the sum of \$64,000. The work to be commenced on the 4th inst., and finished by the first of January.—*Pittsburg Post*, June 9.

#### Memphis and Little Rock Railroad.

The rapid rate at which the water is now receding will soon permit the necessary repairs being made to this road, which it is expected will occupy about three weeks' time, when cars will again make regular trips as far out as Madison.

The Acting Commissioner of the General Land Office has submitted to the Secretary of the Interior, for approval, a supplemental list of lands for the State of Arkansas, comprising an area of over thirty-eight thousand acres, which is applicable to the building of this road. The contract for the construction of twenty-eight miles of the road, between the St. Francis and White rivers, has been let to responsible parties, and the work is being pushed forward as rapidly as the natural impediments of the route will permit.—*Memphis Bul.*

#### Greenville and French Broad Railroad.

The county of Buncombe has subscribed \$125,000 to the capital stock of the above road.

#### Cedar Falls and Minnesota Railroad.

The Dubuque Times states that the agent of the above road has disposed of a portion of the Floyd County bonds in Boston, at par, and that he has made arrangements to dispose of the remainder at the same rate, together with the bonds of the other counties. The Times thinks the speedy building of the Cedar Falls and Minnesota Railroad is a settled matter.

#### Suez Canal.

The work of constructing this great undertaking was formally commenced on the 25th of April last, and the first sod turned by M. Ferdinand de Lesseps, in the presence of the contractor of the works, a large staff of engineers, and native workmen, assembled at the point determined on for the outlet of the canal in the Mediterranean, the construction of jetties, and the harbor of Port Said.

#### South-Western Railroad.

The cars are now running within a half mile of the depot, and will probably reach that building by the 23rd. Passengers, during the past week, have been brought to within two miles of the town, and from thence by stage. The passenger train, we presume, will commence running immediately. The depot will be completed by the middle of June, when the freight trains will run through.—*Cuthbert (Ga.) Reporter*, May 20.



#### SCIENTIFIC AMERICAN.

**MUNN & CO.,**

AMERICAN AND FOREIGN

PATENT SOLICITORS,

Offices 37 Park Row, and 145 Nassau st., N.Y.

CIRCULARS OF ADVICE "How to procure American and Foreign Patents," furnished by **MUNN & CO.**, free of charge. Address as above.

#### Railroad Iron.

THE undersigned have American and Foreign Railroad Iron for sale, deliverable in New York and other markets.

**CASWELL & PERKINS,**

Brokers, 69 Wall st.

New York, January 1, 1859.

#### RAILROAD IRON.

500 TONS American Rails, Erie pattern, 56 lbs. per yard, for sale at Chicago, also about

250 Tons English Rails same size and weight.

**M. K. JESUP & COMPANY,**

New York, June 1, 1859.

44 Exchange Place.

#### RAILROAD IRON.

THE undersigned, agents for the manufacturers, are prepared to make CONTRACTS FOR RAILS delivered free on board at ports in England, or exship at ports in the United States.

**M. K. JESUP & COMPANY,**  
44 Exchange Place.

New York, 1st June, 1859.

#### RAILROAD IRON.

500 TONS, ABOUT 50 LBS. PER LINEAL YARD, "Crawshay's make," and ready for immediate delivery.

For sale by **THEODORE DEHONE,**  
No. 10 Wall St., near Broadway.

#### RAILROAD IRON.

THE undersigned, having been appointed Agents for Messrs. BOLEKOW & VAUGHAN, proprietors of the ESTON, MIDDLESBRO', and WITTON PARK

IRON WORKS, YORKSHIRE, ENG., are prepared to contract for the sale of RAILROAD IRON of a superior quality and on the most advantageous terms.

**MEAD & BELL,**  
17 William st., N.Y.

#### MCNAB, CARR & HARLIN,

A MANUFACTURERS of Steam Engine Builders' and Plumbers' BRASS WORK, such as Globe Valves, Safety Valves, Pump Valves, Whistles, Oil Cups, Steam and Water Gauges, Bibbs, Stops, Basin Cocks, Hose Pipes and Couplings, etc. All parties interested will please send for Catalogue and Price List. Address **McNAB, CARR & HARLIN,** 16 John st., NEW YORK.

#### CAST STEEL,

Of First Quality and Warranted.

**BAR, TOOL, DRILL, AND DIE STEEL.**  
LOCOMOTIVE, CAR AND CARRIAGE CAST STEEL.

**CAR SPRING STEEL.**  
Far superior to the ordinary kind.

**FROG PLATES, POINTS.**

**Saw, File, Cutlery, Rake, Hoe, Axe and Plough Steel.** **GUN METAL.** **Wire and Machinery Steel**  
ORDERS FILLED PROMPTLY AND AT LOW PRICES.

**SALTUS & CO.,**  
45 Cliff st., New York.

#### WEISSENBORN'S PATENT

#### Incrustation Preventer FOR STEAM BOILERS.

EFFECTUALLY obviates the Formation of Scales on the Plates by separating the incrusting matter from the water before it enters the boiler, at the same time condensing a large portion of the steam and supplying the purified water to the boiler at about boiling heat. The apparatus is compact, simple, and applicable to all kinds of Engines. Recent modifications render it still more efficient than heretofore.

Testimony as to its successful operation in preventing scale, and also as a **HEATER AND CONDENSER**, can be furnished by the subscriber.

Probably no modern improvement connected with Steam Power combines so many advantages as this. **The economy of Fuel alone from its use soon repays the cost of the apparatus.** Prices reduced. Terms easy.

**STEWART KERR, Engineer,**  
Agent, 15 Broadway, NEW YORK.

WANTED a situation by a Draughtsman well acquainted with the practical construction of Steam Engines, particularly Locomotive Work.

Address Box 492 Paterson, N.J.

25

#### LOCOMOTIVES.

2 LOCOMOTIVES, about 18 tons, (second hand,) 4 ft. 8½ in. gauge, in excellent order for sale at a bargain.

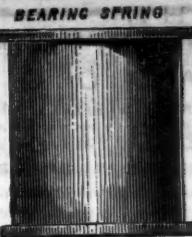
**GEO. T. M. DAVIS,**  
New York, May 24, 1859. 2m 47 Exchange Place.

#### FOR SALE.

2,250 TONS English Rails, (afoaf), 54 lbs. to the lineal yard, Erie pattern, Bars 24 feet long. Terms, CASH.

**GEO. T. M. DAVIS,**  
New York, June 1, 1859. 423 47 Exchange Place.

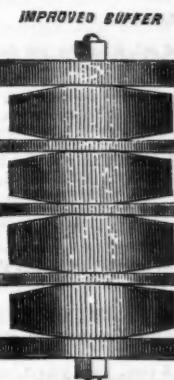
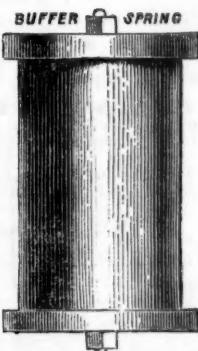
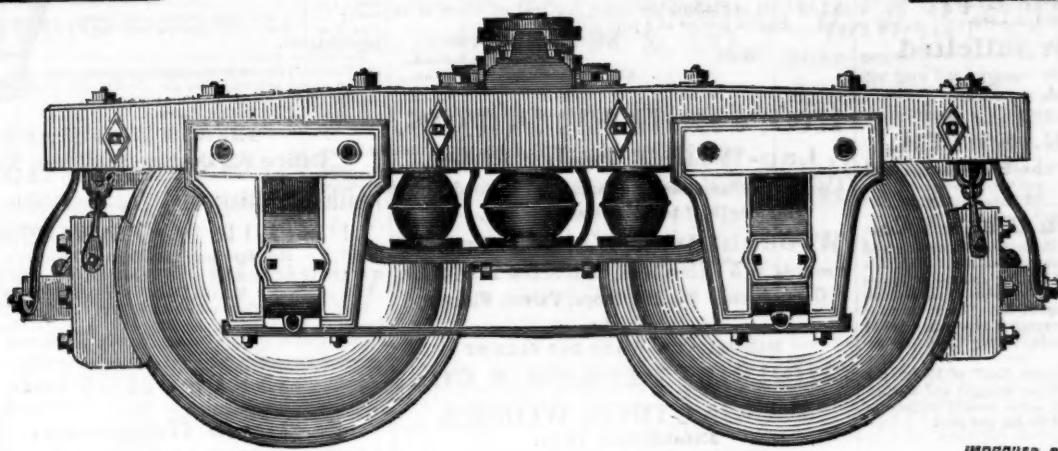




# New England Car Spring Co.

SOLE MANUFACTURERS

OF THE



## India Rubber Car Springs.

OFFICE, 61 CHAMBERS STREET,

NEW YORK.

**NATHANIEL LANE,**  
PATERSON, N. J.,  
COPPERSMITH AND BRASS PLANISHER,  
MANUFACTURER OF  
ORNAMENTAL, SHEET BRASS AND COPPER WORK  
FOR LOCOMOTIVE ENGINES,  
Brass Domes, Escape Pipes, Steam-Chest Covers,  
Cylinder Heads, Jackets, Raised Bands for Boilers, etc., etc.,  
Also, Smoke Stacks and Russia Iron Jackets.  
Also, COPPER FLUES OF SUPERIOR QUALITY, and  
all other Copper Work for Locomotive and Stationary Engines.  
Also and German Silver Name and Number Signs  
FOR LOCOMOTIVE ENGINES,  
Furnished at unusual short notice.

## ROLLING MILL FOR SALE.

A MERCHANT IRON AND WIRE ROD ROLLING  
MILL, situated in the City of Wheeling, Va., with  
two banks in rear of the mill containing an abundance of good  
bituminous coal.

The cost of the fuel delivered to the furnaces is but two and  
one-half cents per bushel.  
Attached to the mill is a WIRE FACTORY and its  
appurtenances. Also a KIRK STEAM HAMMER for  
forging Car Axles, etc. There is extra shafting and  
power for other work if required.

The extraordinary cheapness of the fuel, and the  
facility for obtaining metals, and for shipping, both by water  
and rail, to all parts, particularly west and south, makes the lo-  
cation a desirable one for the manufacture of IRON in any or  
the branches.

For particulars address either of the subscribers.

P. A. BURDEN, Lansingburg, N. Y.  
C. DEWEY, Cadiz, Harrison Co., Ohio.  
E. M. NORTON,  
F. C. HILDRETH, { Wheeling, Va. 820

## RAILROAD IRON AND COMMON BARS.

THE UNDERSIGNED,

Sole Agents to Messrs. GUEST & CO.,  
The Proprietors of the Dowlais Iron Works,  
Near Cardiff, South Wales,

ARE duly authorized to contract for the sale of their G. L.  
Railroad Iron, and Common Bars, on most advantageous  
terms.

R. & J. MAXIN, 70 Broad st.

## STEEL, FILES, &c.

R. GROVES & SONS,  
SHEFFIELD, ENGLAND,

MANUFACTURERS of warranted Cast Steel, superior  
quality, for Tools, Machinery, and Engineering purposes  
Single and Double Shear, Blister, German Spring and Sheet  
Steel of every description—also, Cast Steel Files of high re-  
putation, especially adapted for the use of Machinists, and Saw  
and Edge Tools of all kinds.

A stock of the above goods constantly on hand.

CORPORATE MARK



CHAS. CONGREVE & SON, Agents,  
13 Cliff street, N. Y.

## RAILROAD IRON.

The Undersigned, Agents for the Manufacturers  
ARE PREPARED TO CONTRACT TO DELIVER

Free on Board at Shipping Ports in England, or  
At Ports of Discharge in the United States,

RAILS OF SUPERIOR QUALITY,  
And of Weight or Pattern as may be required.

VOSE, LIVINGSTON & CO.,  
New York, Aug. 1, 1855. 9 South William Street.

## RAILROAD IRON. WOOD, MORRELL & CO.,

Having leased the extensive Works of the  
Cambria Iron Company,

Situated at Johnstown, Cambria Co., Penna.,

And purchased all their real estate,  
A RE now prepared to execute, at short notice, orders for  
RAILS of any required pattern or weight, on the most  
liberal terms.

Philadelphia Office, { North Penna. R. R. Building,  
No. 407 Walnut st.

## THE ROUND OAK IRON WORKS, STAFFORDSHIRE, ENGLAND.

Lord WARD, Proprietor.  
MANUFACTURE RAILS, BOILER PLATES,  
SHEETS, HOOPS AND BARS, of every variety  
of pattern.

NORRIS & BROTHER,  
Agents for the United States,  
12 SOUTH CHARLES STREET,  
BALTIMORE,  
And 17 NASSAU STREET, NEW YORK.

## RAILROAD IRON. THE RENSSELAER IRON COMPANY, TROY, N. Y.,

OFFER Rails of their own manufacture deliverable as may  
be desired by purchasers.

## OLD RAILS

received in exchange for new, or for re-manufacturing.

JOHN A. GRISWOLD, Agent,

TROY, N. Y.

New York Agency:

BUSSING, CROCKER & DODGE,  
32 CLIF ST.

**THE  
RAILROAD IRON MILL COMPANY,  
CLEVELAND, OHIO,  
MANUFACTURERS EXCLUSIVELY OF  
RAILROAD IRON.**

THIS is a new ROLLING MILL, having been working only eighteen months, and confined to work for roads on this line between Buffalo and Chicago in re-rolling old Rails. The capacity is Forty Tons per day. It is well situated for receiving old Rails, either by Railroad or Lake.

**Orders are now solicited**

From Roads in other sections of the country; and work will be made with New Iron in the heads, if desired.

Apply to

**ALBERT G. SMITH,**  
President of the Incorporation.

February, 1858.

**TUBULAR RAIL.**



Railroad Managers will be interested by an examination of the "TUBULAR RAIL," patented in Europe and America by STEPHENS & JENKINS, Covington, Ky. These rails have decided advantages over any rail hitherto made, among them the following:—

The "Tubular Rail" of 50 lbs. per yard has greater strength and elasticity, with the same outside surface as solid rails of 60 lbs. per yard.

Its density is greater, Its welding nearer perfect, and Its durability superior.

Unlike other new forms of rail, it can be put down on the same chairs, and with the same fastenings, used with common T rails.

The arrangements to manufacture are such that these rails can be furnished of any American or Foreign make.

Reference is made to the officers of all the railroads in the vicinity of Cincinnati.

Additional particulars and circulars may be had by addressing

**E. W. STEPHENS,**  
Cincinnati, Ohio.

**RAILROAD IRON.**

THE subscriber is prepared to enter into CONTRACTS FOR RAILS delivered at an English port or at a port in the United States.

**JAMES TINKER,**  
54 Exchange Place,  
NEW YORK.

Eric Rails, 57 to 58 lbs. per yard, on hand in NEW YORK and NEW ORLEANS.

**RAILROAD IRON.**

THE subscribers are prepared to contract for RAILS delivered at an English port or at a port in the United States. Also for all descriptions of

**RAILROAD EQUIPMENTS**  
upon favorable terms.

**JOHN W. HULL & CO.,**  
No. 41 Exchange Place, NEW YORK.

**RAILROAD IRON.**

The undersigned, Agents for leading Manufacturers in STAFFORDSHIRE AND WALES, ARE PREPARED TO CONTRACT FOR DELIVERY

On board ship at Liverpool, or Welsh port.

**G. CONGREVE & SON,**  
18 Chancery St., N. Y.

**RAILROAD IRON.**  
CONTRACTS FOR RAILS,  
AT A FIXED PRICE OR ON COMMISSION,  
DELIVERED AT AN ENGLISH PORT,

Or at a Port in United States,  
WILL BE MADE BY THE UNDERSIGNED,  
**THEODORE DEHON,**

10 Wall St., near Broadway, New York.

500 tons T rails on hand 54 to 57 lbs. per linear yard.

**RAILROAD IRON.**  
The Subscribers, Agents for the Manufacturers,  
ARE PREPARED TO CONTRACT FOR THE  
DELIVERY OF RAILROAD IRON AT ANY PORT  
in the United States or Canada, or at a shipping port in Wales.

**WAINWRIGHT & TAPPAN,**  
Boston, June, 1858.

**RAILROAD IRON.**  
The Crescent Manufacturing Company,  
WHEELING, VA.

A RE now prepared to execute, at short notice, orders for Rails of any required pattern and weight, and to re-roll old rails, on the most liberal terms. Address

**N. WILKINSON, Secy.**  
WHEELING, VA.

**RAILROAD IRON.**

W ELSH or Staffordshire make, delivered on board at an English port or at a port in the United States.

**NORRIS & BROTHER,**  
BALTIMORE,  
And 17 Nassau St., NEW YORK.

**IRON BOILER FLUES.**

Lap-Welded Boiler Flues,  
1½ to 7 inches outside diameter, cut to definite length, 2 to 20 feet as required.

**Wrought Iron Welded Tubes,**  
from ½ to 5 inches bore, with Screw and Socket Connections. T's, L's, Stops, Valves, Flanges, &c., &c.

MANUFACTURED AND FOR SALE BY  
**MORRIS, TASKER & CO.,**

**PASCAL IRON WORKS.**

Established 1821.

Warehouse—209 South Third st.,  
PHILADELPHIA.

STEPHEN MORRIS,  
THOS. T. TASKER, JR.

CHAS. WHEELER, JR.,  
STEPHEN P. M. TASKER.

**MORRIS & JONES & CO.,**

**IRON MERCHANTS,**

MARKET AND SIXTEENTH STREETS,

PHILADELPHIA.

**IRON AND STEEL**

IN ALL THEIR VARIETIES.

BOILER PLATE, CAR AXLES,  
BOILER RIVETS, RAILROAD IRON,  
CUT NAILS AND SPIKES, PIG IRON, etc.

Having the selling agency of a number of the Rolling Mills Furnaces and Forges in this State, orders for any description of Iron can be executed.

August 16, 1858

173

**LACKAWANNA  
IRON AND COAL COMPANY,**

SCRANTON, LUZERNE CO., PA.

BY the completion of the Delaware, Lackawanna and Western Railroad, this Company are enabled to obtain the Magnetic Ores from the most celebrated mines in New Jersey, which used in combination with their native ores, produce a quality of iron not surpassed.

These works have been greatly enlarged the past year, and are, therefore, prepared to execute orders promptly for RAILROAD IRON of any pattern and weight, Car Axles, Spikes, and Merchant Iron. They have on hand patterns for T rails of the following weights per lineal yard, viz.:—25, 30, 36, 40, 45, 50, 60, 62, and 75 lbs.

Samples of Rails and Merchant Iron may be seen at the office of the Company, 46 Exchange Place, New York.

Address J. H. SCRANTON, President,

SORRYSON, PA.

OR DAVID S. DODGE, Treasurer,

46 Exchange Place,

NEW YORK.

401

**JAMES C. LANE,**

Ex-Chief Engineer of Explorations in South America, etc.

MECHANICAL AND CONSULTING ENGINEER,

Times Building, 41 Park Row.

Room No. 4, NEW YORK.

PATENTS NEGOTIATED.

DRAWINGS, Specifications, and Models, (metal or wood.) Applications for Patents, and all business whatever connected with Patents attended to with economy and despatch.

Application for PATENT, including drawings, specifications and Patent Office fees, \$60.

Patents for Inventions.

T. D. STETSON, Agent for procuring patents, No. 5 Tryon Row, (near City Hall). A circular with full information sent free by mail.

American correspondent Proc. Mechanics' J. from 1854.

**RADLEY & HUNTER'S**

**IMPROVED**

**SPARK ARRESTER.**

RADLEY & HUNTER'S CELEBRATED NEW INVENTION is now offered to the public as a Perfect Spark Arrester, which possesses the advantage over ALL OTHERS of being of the most simple construction, and much more durable than any ever used. The manufacturer invites an examination of this Arrester by the Railroad public, confident that it will meet with universal approbation.

The undersigned hereby gives public notice that he is the sole manufacturer of the above article under the Radley & Hunter Patent, of whom alone they can be purchased in the United States.



**EDWIN R. BENNET,**  
Office 82 Duane St., New York.

Leather Belting and India Rubber Hose.

**PHILIP F. PASQUAY,**  
25 Spruce St., New York.

MANUFACTURER of Superior Oak Tanned Stretched and Riveted MACHINE LEATHER BELTING. Best Lace Leather and Steel Hooks always on hand; also Dealer in Vulcanized India Rubber Goods—viz., Croton and Steam Hose of all sizes. Steam and Piston Packing.

**INSTRUMENTS.**

**Hugo Harttman,**

MANUFACTURER of Engineers' and Surveyors' Instruments, 223 Dock St., PHILADELPHIA.

**E. BROWN & SON,**  
MANUFACTURERS OF  
TRANSITS, LEVELS,  
RODS, CHAINS, ETC.  
No. 27 FULTON SLIP, N. Y.

ENGINEERS' AND SURVEYORS' INSTRUMENTS, MADE BY  
**Edmund Draper,**  
Surviving partner of  
**STANCLIFFE & DRAPER,**



No. 22 Pear Street, below Walnut,  
near Third St., PHILADELPHIA.

**J. T. Hobby,** (formerly SAWYER & HOBBY,) MATHEMATICAL Instrument Maker, at the old stand, 156 Water St., NEW YORK. iy33

**James Prentice,**  
NASSAU St., N. Y., Manufacturer of Mathematical Instruments of every description. Orders promptly filled.

**W. & L. E. Gurley, Troy, N.Y.,**  
MANUFACTURERS of Engineers' and Surveyors' Instruments. Descriptive and priced catalogue gratis.

**Knox & Shain,**  
MANUFACTURERS of Engineering & Telegraphic Instruments, 46½ Walnut St., Phila. (Two premiums awarded.)

**F. W. & R. King,**  
MANUFACTURERS of Engineers', Surveying and Drawing Instruments, No. 226 Baltimore St., BALTIMORE, Md.

**Richard Patten,**  
MANUFACTURER of Mathematical Instruments to the U. S. Government, No. 55 Baltimore St., BALTIMORE, Md.

**James W. Queen & Co.,** Philad., MANUFACTURERS of Engineers' Levels, Transits, Chains, Tapes, &c. Priced catalogues by mail gratis.

**Wm. J. Young**  
HAS removed his Engineering and Surveying Instrument Manufactory to No. 48 North Seventh Street, Philadelphia.

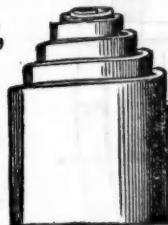
**H. SAWYER**  
(of the late firm of SAWYER & HOBBY), MANUFACTURER of Transits and Levels, has removed to Union Place, near Washington Av. Yonkers, N. Y.

**STEEL  
CAR SPRINGS,**  
MANUFACTURED  
BY THE  
PATENTEE,  
**CARLOS FRENCH,**  
SEYMOUR, CONN.

THESE SPRINGS are now in use on many of the leading Railroads East, South and West. Samples can be examined and Price Lists obtained at No. 3 Gold st., NEW YORK.

**NEW YORK  
METALLIC CAR SPRING  
COMPANY.**

FACTORY, OFFICE,  
No. 316, 318,  
320 & 324  
West 26th St.,  
NEW YORK.



No. 54 William  
Street,  
NEW YORK.

TRUSTEES:  
COURTLANDT PALMER, President.  
HOBART FORD. E. T. H. GIBSON.  
G. D. GIBSON. ROLLIN SANFORD.  
RICHARD VOSE, Secretary.  
CHARLES D. GIBSON, Treasurer.

The above Company are now prepared to execute all orders for the

**GARDINER  
CONICAL VOLUTE CAR SPRING,  
WITH DISPATCH.**

Two years faithful trial of the above Spring has found it to be THE BEST CAR SPRING IN USE. They are now being permanently adopted by many of our largest roads.

Those who have not already tried them, should take the earliest opportunity to do so.

Address orders to

CHARLES D. GIBSON, Sup't,  
BOX 4,055, NEW YORK.

**JAMES JEFFRIES & SONS,**  
MANUFACTURERS OF  
LOCOMOTIVE, CAR AND TANK  
**SPRINGS,**  
PHILADELPHIA, (rear of Girard House.)  
REFERENCES.

M. W. BALDWIN & CO., R. NORRIS & SON, A. WHITNEY & SONS, Philadelphia; JOS. B. ANDERSON, Richmond; SMITH & PERKINS, Alexandria, Va.; JNO. EDGAR THOMSON, of Penn. R. R.; EDWARD C. DALE, of P. O. & R.R.; S. RUTH, of Rich. F. & T. R.R.; THOS. DODAMEAD & Co., Peterburgh; H. D. BIRD, of South Side R. R., Peterburgh; C. O. S. SANFORD, of Peterburgh; JNO. R. MCDANIEL, of Vg. & Tenn. R. R.; JAS. F. ROBERTSON, of Wilmington and M. R. R.; HENRY T. PEAKE, of S. C. R. R.; S. S. SOLOMONS, of North East R. R.; JOHN FLYNN, of Western & Atlantic, R. R.; E. F. ROWARTH, of Greenville & Col. R. R.; GEO. YONGE, of Georgia R. R.; WM. CLARK, of Muscogee R. R.; W. W. BALDWIN, of Montgomery & W. P. R. R.; WM. M. WADLEY, of N. O. J. & G. N. R.; A. B. SEGER, of Opelousas R. R.; C. WILLIAMS, of Mobile; ALLEN S. SWEET, of Buffalo and Erie R. R.; F. ARMS, of Memphis; H. COFFIN, of Memphis; A. WORRELL, of Seaboard & R. R.; UNION CAR WORKS, Port-land; WM. M. HIGHT, of Augusta; S. & R. H. RIKERS, of Shapton & PATSCH, Charleston, and all Roads where SPRINGS are in use.

Will be happy to furnish a SET OF SPRINGS to such companies as may wish to try their Durability and Elasticity, by writing us the Length, Width, Curve over, and the weight which they are to bear.

**S. B. BOWLES,  
MANUFACTURER AND DEALER IN  
RAILROAD  
SUPPLIES,**  
No. 12 GOLD STREET,  
(Between PLATT and MAIDEN LANE),  
NEW YORK.

**HOLT, GILSON & CO.,**  
MANUFACTURERS AND DEALERS

IN  
**RAILROAD & STEAMBOAT  
SUPPLIES,**

5 WATER ST., BOSTON.  
**LOCOMOTIVES AND CARS.**

Rails, Sleepers, Chairs, Spikes, Wheels, Axles and Tires.

BOILER TUBES AND FELTING.

**BOLTS, NUTS & WASHERS.**  
CAR, SHIP AND BRIDGE BOLTS.

Locomotive, Hand and Ship Lanterns; Car Trimmings of all descriptions, Steam and Water Gauges; Signal Bells, etc., etc.

AGENTS FOR CAR HEAD LININGS.

Sole Agents for TOMMEY'S celebrated GAUGE GLASSES, and PAKER'S IMPROVED RATCHET DRILL. Orders filled with despatch and at the lowest prices.

#### RAILROAD SUPPLIES.

**GILBERT, MURDOCK & CO.,**  
No. 64 Exchange Place,  
NEW YORK,

A RE agents for, and prepared to furnish at manufacturers' prices,

**RAILROAD IRON,  
LOCOMOTIVE ENGINES,  
RAILROAD CARS,  
CAR WHEELS,  
AXLES, CHAIRS,  
SPIKES, TOOLS,  
ETC., ETC.**

All inquiries in reference to the above articles will receive immediate attention.

NEW YORK, January, 1859.

**GEO. M. FREEMAN,**  
SUCCESSOR TO  
**PRATT & FREEMAN,**  
PHILADELPHIA  
RAILWAY SUPPLY AGENCY,  
No. 123 WALNUT STREET,  
PHILADELPHIA.

Railroad Materials, Locomotive and Car Findings, MACHINERY AND MACHINISTS' TOOLS, MINERS' TOOLS, ETC.

COTTON WASTE.

WHITE AND YELLOW CAR GREASE,

LOCOMOTIVE BRASS WORK, Baggage Checks, Barrows, etc., etc.

RAILROAD LANTERNS, SIGNAL LIGHTS,

STEAM GAUGES, COCKS AND WHISTLES,

INDIA RUBBER HOSE PACKINGS, ETC.

LANTERNS OF ALL DESCRIPTIONS,

ENGINE, STATION, AND SIGNAL BELLS,

Superior Car Upholstery, etc.

AGENCY OF THE KEROSENE OIL COMPANY.

Orders solicited, promptly filled, and forwarded with despatch and care at the manufacturers' lowest prices.

MORRIS K. JESUP, JOHN KENNEDY, GILDED A. SMITH.

**M. K. JESUP & CO.,**  
RAILWAY AGENTS AND BANKERS,  
44 EXCHANGE PLACE,  
NEW YORK,

AGENTS FOR THE SALE OF  
FOREIGN AND AMERICAN RAILROAD IRON  
AND ALL MATERIALS NECESSARY FOR THE  
Construction, Equipment & Operating of Railways.

**RAILWAY AND OTHER SECURITIES  
BOUGHT AND SOLD**  
Either privately or at the Board of Brokers.

**A. S. & A. G. WHITON**  
32 PINE ST., NEW YORK,

DEALERS IN

**RAILROAD IRON,  
CHAIRS AND SPIKES,  
LOCOMOTIVES,  
PASSENGER AND FREIGHT CARS.**

MANUFACTURERS' AGENTS

FOR Miller's Iron Turn Tables, Dingley's Patent Blower, Gardner's Volute Car Springs and  
RAILWAY SUPPLIES GENERALLY.

ALSO

NEGOTIATORS OF SECURITIES.

**A. BRIDGES & CO.,**

MANUFACTURERS AND DEALERS IN

**RAILROAD AND CAR  
FINDINGS,**

OF EVERY DESCRIPTION,

64 COURTLANDT ST., NEW YORK.

RAILROAD AXLES, WHEELS AND CHAIRS,  
**SPIKES, BOLTS,**

NUTS, WASHERS,

CAR, SHIP AND BRIDGE BOLTS.

IRON FORGINGS OF VARIOUS KINDS, ETC., ETC.

STEEL AND RUBBER SPRINGS,

LOCOMOTIVE AND HAND LANTERNS,

PORTABLE FORGES AND JACK SCREWS,

COTTON DUCK FOR CAR COVERS,

BRASS AND SILVER TRIMMINGS.

Also, Sole Agents for the Manufacturers of Car Head Linings.

Orders for the purchase of goods on commission, aside from our regular business, respectfully solicited.

ALBERT BRIDGES. JOEL C. LANE.

**RAILROAD SUPPLIES.**

**WILLIAMS & PAGE,**

No. 44 Water, between Congress and Kilby Streets,

Boston, Mass.

Iron Rails, Chairs, & Spikes,  
FREIGHT AND COAL CARS,

(on hand or made at short notice.)

Wheels and Axles of all kinds,

LOWMOOR, AMES', BOWLING AND NASHUA TIRES,

IRON AND STEEL,

Or all kinds for Shops and Tracks,

Car Trimmings, Paints, Oil, Varnish, Car and Switch

Locks, Ventilators, Lanterns, Head-Lights, Gauges, Rubber

Spikes, Chairs, Hose and Belting, Ash, Pine and other Tim-

ber, and ALL MATERIALS USED in Equipment and Repairs of

Railroads, Engines and Cars, at lowest prices.

THOS. S. WILLIAMS, PHILIP S. PAGE,

Late Supt Boston & Maine R. R. Late PAGE, ALDEN & CO.

REFERENCE.

JAMES HATWARD, President PHILIPS, Dodge & Co., N. Y.

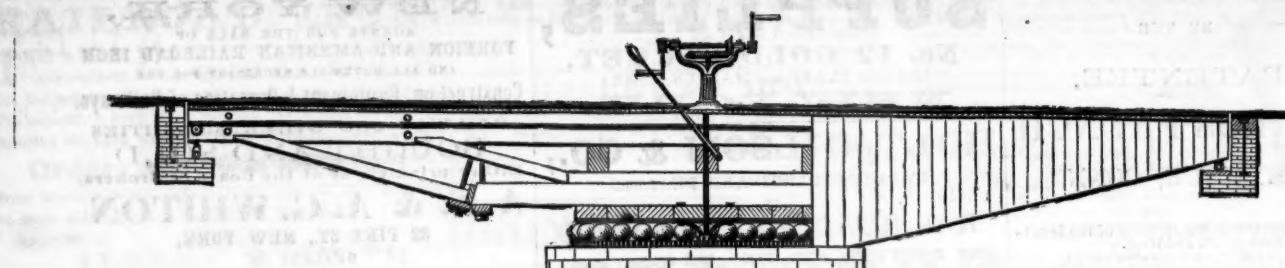
Boston and Maine R. R. COOPER, Hewitt & Co., do.

Capt. WM. H. SWIFT, Boston, REEVES, Buck & Co., Phila.

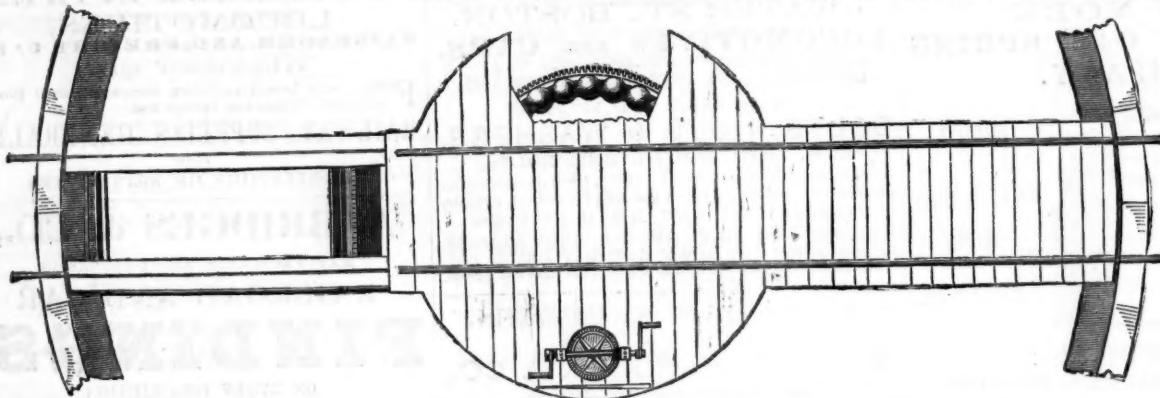
LAWRENCE, Stone & Co., do. E. S. CHESBROUGH, Chicago.

S. M. FULTON, Frost Phila., W. & B. R. R.

# WARD'S PATENT SELF-CENTERING TURN-TABLE.



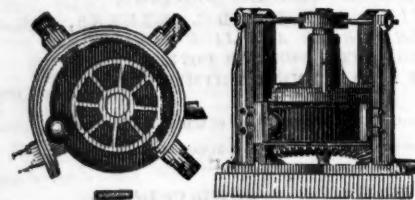
THIS TABLE is adapted to all localities and climates—Is constructed without the Central-Pivot, or Rubbing Journals, thereby improving with use.—It is cheap, strong and durable, and works with ease and freedom, requiring less expensive foundations, and suitable for the turning platforms of swing-bridges, mortar-beds, pivot-gun-carriages, etc.



These TABLES are already introduced, and give general satisfaction.—They are manufactured in TOLEDO, Ohio, by R. F. RUSSELL, of the "Toledo Novelty Works," and in ALEXANDRIA, Virginia, by THOMAS S. JAMEISON, to either of whom orders may be sent, or to the undersigned, patentee, at AUBURN, Cayuga County, New York.  
May 2nd, 1859.

W. H. WARD.

## HENRY BURDEN'S PATENT REVOLVING SHINGLING MACHINE.



THE subscriber having recently purchased the Right of this Machine for the United States, now offers to make transfers of the Right to run said Machine, or sell to those who may be desirous to purchase the Right for one or more of the States.

This Machine is now in successful operation in ten or twelve Iron Works in and about the vicinity of Pittsburg, also at Phoenixville, and Reading, Pa., Covington Iron Works, Md., Troy Rolling Mills, and Troy Iron and Nail Factory, Troy, N. Y., where it has given universal satisfaction.

Its advantages over the ordinary Forge Hammer are numerous:

Considerable saving in first cost; saving in power; the entire saving in shingler's, or hammerman's wages, as no attendance whatever is necessary.

It being entirely self-acting; saving in time from the quantity of work done, as one machine is capable of working the iron from sixty puddling furnaces; saving of waste, as nothing but the scoria is thrown off, and that most effectually; saving of staff, as none are used or required.

The time required to furnish a bloom being only about six seconds, the scoria has no time to set, consequently is got rid of much easier than when allowed to congeal, as under the hammer.

The iron being discharged from the machine so hot, rolls better and is much easier on the rollers and machinery.

The bars roll sounder, and are much better finished.

The subscriber feels confident that persons who will examine for themselves the machinery in operation, will find it possesses more advantages than have been enumerated.

For further particulars address the subscriber at TROY, N. Y.

P. A. BURDEN.

WATERBURY BRASS AGENCY,  
ALEX. ANDERSON, AGENT.  
52 BEEKMAN STREET, NEW YORK,  
FOR THE SALE OF  
SHEET BRASS,  
COPPER AND BRASS WIRE,  
BRASS AND COPPER TUBING,  
COPPER RIVETS AND BARS, ETC.  
Manufactured at WATERBURY, Conn.

## Railroad Spikes & Wrought Iron Fastenings.

THE TROY IRON AND NAIL FACTORY, EXCLUSIVE OWNER of all Henry Burden's Patented Machinery for making Spikes, have facilities for manufacturing large quantities upon short notice, and of a quality unsurpassed.

Wrought Iron Chairs, Clamps, Keys and Bolts for Railroad Fastenings, also made to order. A full assortment of Ship and Boat Spikes always on hand.

All orders addressed to the Agent at the Factory will receive immediate attention. WM. F. BURDEN, Agent, Troy Iron and Nail Factory, Troy, N. Y.

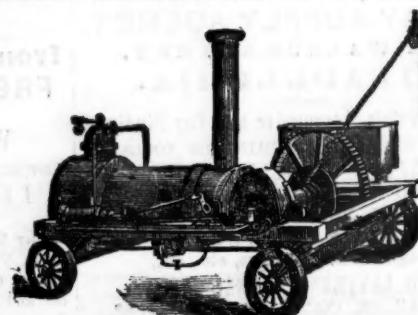
## Patent Machine-made Horse Shoes.

THE TROY IRON AND NAIL FACTORY have always on hand a general assortment of Horse Shoes made from Refined American Iron.

Four sizes being made, it will be well for those ordering to remember that the size of the Shoe increases as the numbers—No. 1 being the smallest.

WM. F. BURDEN, Agent,  
Troy Iron and Nail Factory, Troy, N. Y.

FIRST INTRODUCED JULY, 1849



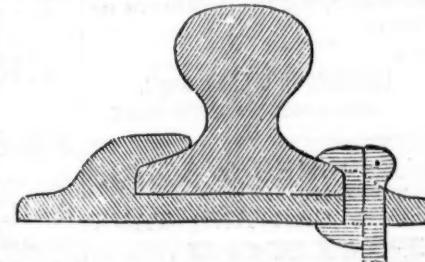
A. L. ARCHAMBAULT,  
MANUFACTURER OF  
PORTABLE STEAM HOISTING  
AND PUMPING ENGINES,  
From 8 to 30 horse-power, and  
STATIONARY ENGINES, from 8 to 100 horse-power  
S. E. cor. Fifteenth and Hamilton Sts.,  
PHILADELPHIA.

## RAILROAD SPIKE COMPANY,

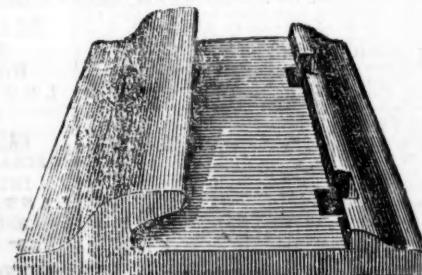
SUCCESSORS TO PORTER, ROLFE & SWETT,

MANUFACTURERS OF

## RAILROAD SPIKES AND CHAIRS, PITTSBURG, PA.



HAVING built a large Rolling Mill with new and improved Machinery, we are fully prepared to execute orders at the lowest rates, for any amount of SPIKES and CHAIRS made of the best JUNIATA IRON.



Particular attention is invited to our NEW WROUGHT IRON CHAIR, as being the best in use.

DILWORTH & BIDWELL.